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Report on the individual review of the inventory submission of the Russian Federation submitted in 2023*

Note by the expert review team

Summary

Each Party included in Annex I to the Convention must submit an annual inventory of emissions and removals of greenhouse gases for all years from the base year (or period) to two years before the inventory due date (decision 24/CP.19). Parties included in Annex I to the Convention that are Parties to the Kyoto Protocol also report supplementary information under Article 7, paragraph 1, of the Kyoto Protocol with the inventory submission due under the Convention. This report presents the results of the individual review of the 2023 inventory submission of the Russian Federation, conducted by an expert review team in accordance with the "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual greenhouse gas inventories", and the "Guidelines for review under Article 8 of the Kyoto Protocol", as appropriate. The review took place from 18 to 22 September 2023 in Bonn.

* In the symbol for this document, 2023 refers to the year in which the inventory was submitted, not to the year of publication.

Contents

Abbreviations and acronyms

2006 IPCC Guidelines	*2006 IPCC Guidelines for National Greenhouse Gas Inventories*
2019 Refinement to the 2006 IPCC Guidelines	*2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories*
AD	activity data
Article 8 review guidelines	"Guidelines for review under Article 8 of the Kyoto Protocol"
C	carbon
CH_4	methane
CO	carbon monoxide
CO_2	carbon dioxide
CO_2 eq	carbon dioxide equivalent
COF	carbon oxidation factor
Convention reporting adherence	adherence to the "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual greenhouse gas inventories"
COPERT	software tool for calculating road transport emissions
CPR	commitment period reserve
CRF	common reporting format
DOC	degradable organic carbon
DOC(x)	weighted average of biodegradable organic carbon
EF	emission factor
ERT	expert review team
FAOSTAT	statistical database of the Food and Agriculture Organization of the United Nations
GE	gross energy intake
GHG	greenhouse gas
GWP-100	100-year global warming potential values
HFC	hydrofluorocarbon
HWP	harvested wood products
ICSCF	implied carbon stock change factor
IE	included elsewhere
IEF	implied emission factor
IPCC	Intergovernmental Panel on Climate Change
IPPU	industrial processes and product use
k	methane generation rate
LPG	liquefied petroleum gas
LULUCF	land use, land-use change and forestry
MCF	methane conversion factor (agriculture)
MMS	manure management system(s)
MSW	municipal solid waste
N	nitrogen
N_2O	nitrous oxide
NA	not applicable
NE	not estimated
NEU	non-energy use
Nex	nitrogen excretion
NF_3	nitrogen trifluoride
NIR	national inventory report
NMVOC	non-methane volatile organic compound

NO	not occurring
NO_X	nitrogen oxides
ODS	ozone-depleting substance(s)
PFC	perfluorocarbon
QA/QC	quality assurance/quality control
Rosstat	Russian Federal State Statistics Service
SF_6	sulfur hexafluoride
SIAR	standard independent assessment report
SO_2	sulfur dioxide
SOC	soil organic carbon
SO_X	sulfur oxides
SWDS	solid waste disposal site(s)
TOW	total organic load in wastewater
UNFCCC Annex I inventory reporting guidelines	"Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual greenhouse gas inventories"
UNFCCC review guidelines	"Guidelines for the technical review of information reported under the Convention related to greenhouse gas inventories, biennial reports and national communications by Parties included in Annex I to the Convention"
VS	volatile solid(s)
Wetlands Supplement	2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands
Y_m	methane conversion rate

I. Introduction

1. This report covers the review of the 2023 inventory submission of the Russian Federation, organized by the secretariat in accordance with the UNFCCC review guidelines, particularly part III thereof, namely the "UNFCCC guidelines for the technical review of greenhouse gas inventories from Parties included in Annex I to the Convention" (annex to decision 13/CP.20), and the Article 8 review guidelines (adopted by decision 22/CMP.1 and revised by decision 4/CMP.11). The review took place from 18 to 22 September 2023 in Bonn and was coordinated by Sevdalina Todorova (secretariat). Table 1 provides information on the composition of the ERT that conducted the review for the Russian Federation.

Table 1
Composition of the expert review team that conducted the review for the Russian Federation

Area of expertise	*Name*	*Party*
Generalist	Violeta Hristova	Bulgaria
	Batimaa Punsalmaa	Mongolia
Energy	Hossein Khajeh Pour	Islamic Republic of Iran
	Mandana Maghsoodi Darbeh	Islamic Republic of Iran
	Victoria Novikova	Belarus
	Irina Vasiliev	Republic of Moldova
	Songli Zhu	China
IPPU	Menouer Boughedaoui	Algeria
	Stephen Isaacs	Bahamas
	Samir Tantawi	Egypt
Agriculture	Evgeniya Bertosh	Belarus
	Yu'e Li	China
	Rosemary Lopez	Cuba
	Noura Mohamed Lotfy	Egypt
LULUCF	Tatenda Gotore	Zimbabwe
	Admore Mureva	Zimbabwe
	Pinar Pamukcu Albers	Türkiye
	Marina Shvangiradze	Georgia
Waste	Natalia Efros	Republic of Moldova
	Excellent Hachileka	Zambia
	Guadalupe Alejandra Martinez	Uruguay
	Kyoko Miwa	Japan
	Tatiana Tugui	Republic of Moldova
Lead reviewers	Violeta Hristova	
	Songli Zhu	

2. The basis of the findings in this report is the assessment by the ERT of the Party's 2023 inventory submission in accordance with the UNFCCC review guidelines and the Article 8 review guidelines.

3. The ERT has made recommendations that the Russian Federation resolve identified findings, including issues[1] designated as problems.[2] Other findings, and, if applicable, the encouragements of the ERT to the Russian Federation to resolve related issues, are also included in this report.

4. A draft version of this report was communicated to the Government of the Russian Federation, which provided comments that were considered and incorporated, as appropriate, into this final version of the report.

5. Annex I presents the annual GHG emissions of the Russian Federation, including totals excluding and including LULUCF, indirect CO_2 emissions, and emissions by gas and by sector.

II. Summary and general assessment of the Party's 2023 inventory submission

6. Table 2 provides the assessment by the ERT of the Party's 2023 inventory submission with respect to the tasks undertaken during the review. Further information on the issues identified, as well as additional findings, may be found in tables 3 and 5.

Table 2
Summary of review results and general assessment of the 2023 inventory submission of the Russian Federation

Assessment			*Issue/problem ID#(s) in table 3 or 5[a]*
Dates of submission	Original submission: NIR, 18 April 2023; CRF tables (version 1), 13 April 2023 Revised submission: NIR, 21 June and 16 September 2023; CRF tables (version 2), 29 May 2023 and (version 4), 16 September 2023 Unless otherwise specified, values from the most recent submission are included in this report		
Review format	Centralized		
Source of GWP-100	IPCC Fourth Assessment Report		
Application of the requirements of the UNFCCC Annex I inventory reporting guidelines and the Wetlands Supplement (if applicable)	Have any issues been identified in the following areas:		
	(a) Identification of key categories?	No	
	(b) Selection and use of methodologies and assumptions?	Yes	E.24, I.6, A.5, L.4, L.5, L.17, L.18
	(c) Development and selection of EFs?	Yes	E.4, E.12, E.17, L.24, L.31, L.37
	(d) Collection and selection of AD?	Yes	E.24, I.9, A.16, A.17, L.12, L.13, L.19, L.26, L.41, W.11, W.14
	(e) Reporting of recalculations?	Yes	G.6, A.14
	(f) Reporting of a consistent time series?	Yes	A.17, L.2
	(g) Reporting of uncertainties, including methodologies?	Yes	L.1
	(h) QA/QC?	QA/QC procedures were assessed in the context of the national system (see supplementary information under the Kyoto Protocol below)	
	(i) Missing categories, or completeness?[b]	Yes	E.22, I.11, I.19, L.28, L.30, L.34, W.12

[1] Issues are defined in decision 13/CP.20, annex, para. 81.
[2] Problems are defined in decision 22/CMP.1, annex, paras. 68–69, as revised by decision 4/CMP.11.

Assessment			*Issue/problem ID#(s) in table 3 or 5*[a]
	(j) Application of corrections to the inventory?	No	
Significance threshold	For categories reported as insignificant, has the Party provided sufficient information showing that the likely level of emissions meets the criteria in paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines?	No	I.17
Description of trends	Did the ERT conclude that the description in the NIR of the trends for the different gases and sectors is reasonable?	No	E.7
Supplementary information under the Kyoto Protocol	Have any issues been identified related to the following aspects of the national system:		
	(a) Overall organization of the national system, including the effectiveness and reliability of the institutional, procedural and legal arrangements?	No	
	(b) Performance of the national system functions?	No	
	Have any issues been identified related to the national registry:		
	(a) Overall functioning of the national registry?	NA	
	(b) Performance of the functions of the national registry and the adherence to technical standards for data exchange?	NA	
	Have any issues been identified related to the reporting of information on assigned amount units, certified emission reductions, emission reduction units and removal units and on discrepancies in accordance with decision 15/CMP.1, annex, chapter I.E, in conjunction with decision 3/CMP.11, taking into consideration any findings or recommendations contained in the SIAR?	NA	
CPR	Was the CPR reported in accordance with decision 18/CP.7, annex; decision 11/CMP.1, annex; and decision 1/CMP.8, paragraph 18?	NA	
Response from the Party during the review	Has the Party provided the ERT with responses to the questions raised, including the data and information necessary for assessing conformity with the UNFCCC Annex I inventory reporting guidelines and any further guidance adopted by the Conference of the Parties?	Yes	
Recommendation for an exceptional in-country review	On the basis of the issues identified, does the ERT recommend that the next review be conducted as an in-country review?	No	
Questions of implementation	Did the ERT list any questions of implementation?	No	

[a] Further information on the issues identified, as well as additional findings, may be found in tables 3 and 5.
[b] Missing categories for which methods are provided in the 2006 IPCC Guidelines may affect completeness and are listed in annex II.

III. Status of implementation of recommendations included in the previous review report

7. Table 3 compiles the recommendations from previous review reports that were included in the most recent previous review report, published on 20 May 2020,[3] and had not been resolved by the time of publication of the report on the review of the Party's 2020 annual submission. The ERT has specified whether it believes the Party had resolved, was addressing or had not resolved each issue or problem by the time of publication of this review report and has provided the rationale for its determination, which takes into consideration the publication date of the most recent previous review report and national circumstances.

Table 3
Status of implementation of recommendations included in the previous review report for the Russian Federation

ID#	*Issue/problem classification*[a, b]	*Recommendation from previous review report*	*ERT assessment and rationale*
General			
G.1	QA/QC and verification (G.5, 2020) G.3, 2018) (G.5, 2017) Convention reporting adherence	Improve the QA/QC process undertaken for the NIR and report on the improvements made in the NIR.	Addressing. The Party presented in the NIR (section 1.2.3, p.21) information on the improvements made in the QA/QC process and described the QA/QC process in annex 6 to the NIR. However, the ERT noted inconsistencies between the NIR and CRF table summary 3. For example, for estimates of GHG emissions for category 5.C (incineration and open burning of waste) the NIR (p.416) indicates the use of the tier 2a method for CO_2 emissions and the tier 1 method and default EFs for CH_4 and N_2O emissions, while CRF table summary 3 has blank cells for methods and EFs; for CO_2 emissions for category 2.D (non-energy products from fuels and solvent use) the NIR (p.145) indicates the use of the tier 1 method, while CRF table summary 3 indicates the use of tier 1 and 2 methods; for HFC, PFC, SF_6 and NF_3 emissions for category 2.E (electronic industry) the NIR (p.151) indicates the use of the tier 2a method, while CRF table summary 3 indicates the use of the tier 2 method; for HFC emissions for category 2.F (product uses as ODS substitutes for refrigeration and air conditioning) the NIR (p.157) indicates the use of tier 1a, 1b and 2a methods and from foam blowing agents and aerosols the use of the tier 1a method, while CRF table summary 3 indicates the use of tier 1 and 2 methods; for CH_4 emissions for category 5.A (solid waste disposal) the NIR (p.403) indicates the use of a tier 2 method, while CRF table summary 3 indicates the use of a tier 3 method.

[3] FCCC/ARR/2020/RUS. The ERT notes that the reports on the reviews of the Russian Federation's 2021 and 2022 annual submissions have not been published yet owing to insufficient funding for the review process. As a result, the latest previously published annual review report reflects the findings of the review of the Party's 2020 annual submission.

ID#	*Issue/problem classification*[a, b]	*Recommendation from previous review report*	*ERT assessment and rationale*
			During the review, the Party clarified that the general QA/QC procedures remain unchanged, but more attention was paid to the QC process for the categories in which problems were observed. The noted inconsistencies between the NIR and CRF table summary 3 were attributed to technical errors and the Party plans to introduce additional cross-checks of the NIR and CRF tables to ensure data consistency in the next submission.
G.2	National system (G.11, 2020) Convention reporting adherence	(a) Make fully operational the inventory preparation and management functions of the national system related to implementing general QC procedures (tier 1) and responding to requests for clarifying inventory information resulting from the different stages of the review process for the energy sector, as described in decision 19/CMP.1, annex, paragraphs 14(g) and 16(c), in conjunction with decisions 3/CMP.11 and 4/CMP.11, and provide comprehensive information in the NIR on the specific actions and steps taken to ensure that the indicated inventory preparation and management functions are fully operational in the 2021 annual submission; (b) Verify and correct the internal references in the energy chapter of the NIR, in particular references to the annex to the NIR or appendices to the annex.	(a) Resolved. The Party reported in its NIR (p.100) that the QC procedures for the energy sector referred to in the recommendation have been strengthened and the ERT noted the timely responses to requests for clarifying inventory information during the different stages of the review process, suggesting improved inventory preparation and management functions of the national system. Any previous recommendations linked to inventory preparation for the sector that have not yet been addressed are presented in the relevant sectoral sections of this report. (b) Addressing. The Party reported in the energy chapter of the NIR (chap. 3) correct references to the annex to the NIR and its appendices. However, the ERT considers that the recommendation has not yet been fully addressed because in annex 4 (energy balance) to the NIR (p.94 of the annex), the reference provided in footnote 1 to table II 4.1 regarding the Russian Statistical Yearbook 2022 is incorrect, as this document does not contain the 2021 energy balance data presented in table II 4.1. During the review, the Party provided the correct reference.
G.3	Uncertainty analysis (G.6, 2020) (G.12, 2018) Transparency	Provide in the NIR details on how the re-evaluation of the uncertainty values is periodically accomplished, including after the implementation of improvements (see FCCC/ARR/2018/RUS, ID#s L.6–L.7).	Resolved. The Party reported in its NIR (p.22) that the uncertainty estimates for individual categories and for the overall inventory with and without the LULUCF sector are reviewed annually, and that changes to the EFs or other parameters used in the emission estimates or changes in the AD or their source are considered during the annual uncertainty analysis. The results of the uncertainty assessment are used in the planning process for the development of the next inventory submission.
G.4	Other (G.9, 2020) (G.10, 2018) Transparency	Improve the reporting of indirect CO_2 and N_2O emissions in CRF table 6 by using the appropriate notation keys and providing relevant information in the NIR.	Not resolved. The Party reported indirect CO_2 and N_2O emissions in CRF table 6 as "NE", "NA", "NO" and "IE". The cells in CRF table 6 regarding indirect CO_2 and N_2O emissions of the energy sector are empty. Information regarding the use of "NE" for the IPPU and waste sectors is not presented in either the NIR or CRF table 9. During the review, the Party clarified that it faced some technical issues in using CRF Reporter but that it has started a process to improve the reporting of indirect CO_2 and N_2O emissions in CRF table 6.

ID#	*Issue/problem classification*[a, b]	*Recommendation from previous review report*	*ERT assessment and rationale*
Energy			
E.1	1. General (energy sector) (E.1, 2020) (E.1, 2018) (E.1, 2017) (E.1, 2016) (E.1, 2015) (19, 2014) (21, 2013) (33, 2012) Convention reporting adherence	Review the use of notation keys for all categories in the energy sector and ensure the appropriate selection of notation keys for the complete time series.	Addressing. The Party improved the use of notation keys in CRF table 1.A(a) and clarified in the NIR (p.68) and during the review that most of the notation keys were reviewed. For example, the Party used "NO" instead of the previously used "NA" for both AD and emissions for the following subcategories: 1.A.3.b.i (cars), 1.A.3.b.ii (light duty trucks) and 1.A.3.b.iii (heavy duty trucks and buses (gaseous fuels, biomass and other fossil fuels)); 1.A.3.b.iv (motorcycles (gaseous fuels, biomass and other fossil fuels)); 1.A.3.c (railways (gaseous fuels and biomass)); and 1.A.3.d (domestic navigation (gaseous fuels, biomass and other fossil fuels)). However, the ERT noted some categories for which the recommendation has still not been implemented. For example, for subcategories 1.A.1.b (petroleum refining (solid fuels)) and 1.A.4.c.iii (fishing (gaseous fuels and biomass)), "NA" is still applied for both AD and emissions, when "NO" is correct, as the consumption of these fuels is not occurring. For subcategory 1.A.5.b. (other mobile), "NA" was used for all fuels instead of "IE" when the subcategories were reported at the aggregate level (see ID# E.24 in table 5).
E.2	Fuel combustion – reference approach – all fuels – CO_2 (E.2, 2020) (E.9, 2018) Convention reporting adherence	Correct the labelling of the units used in CRF table 1.A(b) to reflect the actual reporting unit for all fuels and clarify in the NIR that owing to confidentiality, the mass value of fuel consumption available in the energy balance is not public.	Resolved. The Party corrected the labelling of the units used in CRF table 1.A(b) and reported in NIR section 3.2.3.1 (on the reference approach) (p.34) that in table CRF 1.A(b) fuel consumption data for the entire time series are expressed in energy units (TJ). The Party also indicated that fuel consumption values in mass units are not reported for confidentiality reasons, providing in the NIR (p.69) a reference to the federal law of 29 November 2007 on official statistical accounting and the system of State statistics in the Russian Federation (article 4, para. 5; article 9, para. 1).
E.3	Fuel combustion – reference approach – other fossil fuels – CO_2 (E.3, 2020) (E.10, 2018) Transparency	Disaggregate the quantity of bitumen, petroleum coke and any other oil fuels which are listed in CRF table 1.A(b) from other oil, and if this cannot be done in the next annual submission, use the notation key "IE" for bitumen, petroleum coke and any other relevant fuels in CRF table 1.A(b), instead of "NO", and indicate in both the NIR and CRF table 1.A(b) that these fuels are included under other oil.	Resolved. The Party reported in its NIR (p.69) and further explained during the review that the quantity of bitumen, petroleum coke and other oil fuel cannot be disaggregated owing to the peculiarities of the structure of the data provided by Rosstat (i.e. there are no detailed data for petroleum coke for 1998–2021, for bitumen for 1999–2021 or for naphtha for 1990–1992 and 1994–2021). The Party used the notation key "IE" for bitumen, petroleum coke and other relevant fuels in CRF table 1.A(b) for the missing years. The Party created a cell comment in CRF table 1.A(b) for bitumen, explaining that it is included under other oil.
E.4	1.A Fuel combustion – sectoral approach – liquid fuels – CO_2	Develop a country-specific value for the carbon content for liquid fuels, or, in accordance with paragraph 11 of the UNFCCC Annex I reporting guidelines, until this can	Addressing. The Party did not develop country-specific values for the carbon content of liquid fuels and did not provide justification in accordance with paragraph 11 of the UNFCCC Annex I reporting guidelines. In the NIR (p.69) the Party stated that it plans to develop country-specific CO_2 EFs for liquid fuels in the future and explained that

ID#	Issue/problem classification[a, b]	Recommendation from previous review report	ERT assessment and rationale
	(E.6, 2020) (E.12, 2018) Accuracy	be achieved, provide a justification in the NIR explaining the reasons why this was not possible.	an analytical study is under way to determine the composition of liquid fuels used in the country. At present, default EFs are used for all liquid fuels in accordance with the 2006 IPCC Guidelines (vol. 2, chap. 1, table 1.4, pp.1.23–1.24). During the review, the Party confirmed that it plans to implement country-specific CO_2 EFs for liquid fuels in the 2024 submission.
E.5	1.A Fuel combustion – sectoral approach – liquid fuels – CO_2, CH_4 and N_2O (E.8, 2020) (E.13, 2018) Transparency	Provide a clear justification on why it is considered necessary to redistribute among categories the fuel consumption for road transportation reported in the national statistics, which is the main source of data, as a result of the reconciliation of the output results of the COPERT model, and how it is ensured that this approach results in the application of the appropriate technology-specific CH_4 and N_2O EFs to the emission estimates for subcategory 1.A.5.a and other categories. If the appropriateness of the CH_4 and N_2O EFs applied cannot be demonstrated, reconsider the redistribution of the fuels.	Resolved. The Party explained in the NIR (section 3.2.4.3.5, p.58) why it was necessary to redistribute data on gasoline and diesel consumption between subcategories 1.A.3.b (road transportation) and 1.A.5 (other, not specified elsewhere). NIR table 3.19 provides information on the volumes of fuel redistributed between categories as a result of reconciling the output results of COPERT. The Party also added information in the NIR (p.58) noting that for 2013–2021, an improved methodology for verifying fuel consumption was used, so the redistribution of fuels between categories was insignificant. In the NIR (p.69) the Russian Federation indicated that the volumes of fuel consumption in subcategory 1.A.3.b are much higher than in category 1.A.5, which indirectly indicates a reduction in the resulting emission uncertainties.
E.6	1.A.1.a Public electricity and heat production 1.A.1.b Petroleum refining – liquid fuels – CO_2 (E.10, 2020) (E.15, 2018) Transparency	Provide in the NIR clear explanations on the inter-annual changes of the CO_2 IEFs for liquid fuels between 2004 and 2005 for subcategory 1.A.1.a (public electricity and heat production) and subcategory 1.A.1.b (petroleum refining).	Resolved. The inter-annual changes in the CO_2 IEFs for liquid fuels between 2004 and 2005 for subcategories 1.A.1.a (public electricity and heat production) (+5.8 per cent) and 1.A.1.b (petroleum refining) (–11.0 per cent) were addressed in the NIR (p.43), which indicated that for category 1.A.1 (energy industries), the national statistics had only started to disaggregate information in accordance with the reporting structure required by the 2006 IPCC Guidelines in 2005. Therefore, the disaggregation of AD and GHG emissions for category 1.A.1 into subcategories 1.A.1.a (public electricity and heat production), 1.A.1.b (petroleum refining) and 1.A.1.c (manufacture of solid fuels and other energy industries) for 1990–2004 was based on the average consumption of liquid, solid and gaseous fuels for these subcategories available for 2005–2013. The Party also stated that GHG emissions for each subcategory were calculated for each year separately, considering the specific contributions of individual fuels.
E.7	1.A.1.c Manufacture of solid fuels and other energy industries – solid fuels – CO_2 (E.11, 2020) (E.16, 2018) Transparency	Provide in the NIR clear explanations on the inter-annual changes of the CO_2 IEFs for solid fuels between 2004 and 2005 and between 2015 and 2016 for subcategory 1.A.1.c.i (manufacture of solid fuels).	Addressing. The Party did not include in the NIR the reasons for the inter-annual changes specific to the CO_2 IEFs for solid fuels between 2004 and 2005 (–53.2 per cent), between 2011 and 2012 (+35.2 per cent) and between 2015 and 2016 (–25.9 per cent) for subcategory 1.A.1.c.i (manufacture of solid fuels). The Party reported in the NIR (p.43) that for 1990–2004, AD and GHG emissions for category 1.A.1 (energy industries) have been disaggregated into subcategories 1.A.1.a (public

ID#	Issue/problem classification[a, b]	Recommendation from previous review report	ERT assessment and rationale
			electricity and heat production), 1.A.1.b (petroleum refining) and 1.A.1.c (manufacture of solid fuels and other energy industries) on the basis of available information for 2005–2013. The Party also indicated that in the national energy statistics, data on fuel combustion for coke production are aggregated with data on fuel consumption for petroleum refining. For estimating fuel consumption for subcategory 1.A.1.c.i, the Party allocated all solid fuel consumption reported in the energy balance under coke production and petroleum refining to subcategory 1.A.1.c.i for the entire time series. The ERT welcomes the information provided and considers that supplementing the explanation in the NIR and including information on the change in the fuel mix on a fuel basis for solid fuels (e.g. as in NIR table 3.12) across the time series would help to resolve the issue.
E.8	1.A.2.f Non-metallic minerals – all fuels – CO_2, CH_4 and N_2O (E.13, 2020) (E.19, 2018) Comparability	Estimate and report emissions for subcategory 1.A.2.f (non-metallic minerals) separately from 1.A.2.g (other), based on the existing available data from Rosstat and following the disaggregation of the updated CRF tables as required by the UNFCCC Annex I inventory reporting guidelines.	Resolved. The Party reported CO_2, CH_4 and N_2O emissions for subcategory 1.A.2.f (non-metallic minerals) separately from subcategory 1.A.2.g (other) in CRF table 1.A(a)s2 using available data from Rosstat for 2008–2021 and in accordance with the requirements of the UNFCCC Annex I inventory reporting guidelines. Following the recommendation, the NIR (p.46) includes the explanation that for 1990–2007, the national statistics are not disaggregated and hence subcategory 1.A.2.f cannot be presented as a separate subcategory; therefore, for this period, emissions were included under subcategory 1.A.2.g. The separate presentation of emissions for subcategory 1.A.2.f is possible only for 2008 onward. Similar information is included in CRF table 1.A(a) (i.e. that subcategory 1.A.2.f (non-metallic minerals) for 1990–2007 was included under subcategory 1.A.2.g (other), where the data were reported as "IE") and an explanation on the use of the notation key is included in CRF table 9. Given the national circumstances and the technical difficulty of disaggregating the information per subcategory and per fuel for the historical period, the ERT concludes that the approach is acceptable.
E.9	1.A.4.c Agriculture/forestry/ fishing – gasoline – CH_4 and N_2O (E.25, 2020) Transparency	Provide in the NIR a clear explanation of and the rationale underlying the choice and calculation of the CH_4 and N_2O EFs used for estimating CH_4 and N_2O emissions for subcategory 1.A.4.c.ii (off-road vehicles and other machinery) (gasoline).	Addressing. The Party explained in the NIR (p.62) that it used the arithmetic average (110 kg CH_4/TJ and 1.2 kg N_2O/TJ) of the default EFs for motor gasoline (two-stroke engines, 80 kg CH_4/TJ and 2 kg N_2O/TJ; and four-stroke engines, 140 kg CH_4/TJ and 0.4 kg N_2O/TJ) in accordance with the 2006 IPCC Guidelines (vol. 2, chap. 3, table 3.3.1, p.3.36). However, the Party did not provide an explanation of the rationale underlying the choice and calculation of the EFs. In addition, the ERT noted that there are inconsistencies with the information provided in another part of the NIR (p.69), which indicates that the EFs for this category are 80 kg CH_4/TJ and 2 kg N_2O/TJ. During the review, the Party complemented the information by explaining that in calculating the EFs it

ID#	Issue/problem classification[a, b]	Recommendation from previous review report	ERT assessment and rationale
			also considered the average age of tractors used in agriculture and the predominant use of one of the two types of engines (two-stroke or four-stroke). The Party also indicated that an explanation of how the EFs were derived will be provided in the next NIR. The ERT considers that the Party should clarify the inconsistency and correct the text in the NIR to reflect the methodology that was applied to derive the EFs.
E.10	1.B.1.a Coal mining and handling – solid fuels – CH_4 (E.26, 2020) Transparency	Include in the NIR a technical summary of the three key references (Gas Content of Coal Basins,1979; Tailakov et al., 2009; Malishev and Ayruni, 1999) explaining the approaches and procedures undertaken to develop the country-specific CH_4 EFs for subcategory 1.B.1.a.i (underground mines) and its activities, including clear information on the procedures for their verification in order to justify that they were developed in a manner consistent with the 2006 IPCC Guidelines and are considered more accurate than the IPCC default values, in accordance with paragraph 12 of the UNFCCC Annex I inventory reporting guidelines.	Addressing. The Party did not include in its NIR a technical summary of the cited key references and did not provide an explanation of the approaches and procedures undertaken to develop the country-specific CH_4 EFs for underground mines. During the review, the Party provided the ERT with a technical summary of the three key references (Gas Content of Coal Basins,1979; Tailakov et al., 2009; Malishev and Ayruni, 1999) and explained the methodology for developing CH_4 emission coefficients from underground coal mining. The ERT considers that the Party should include this technical summary (e.g. as an annex to the NIR) to resolve this issue.
E.11	1.B.1.a Coal mining and handling – solid fuels – CH_4 (E.27, 2020) Transparency	Provide in the NIR a clear explanation for the differences between the country-specific CH_4 EFs for subcategory 1.B.1.a.ii (surface mines) reported in NIR table 3.30 (p.90) and the corresponding default values from the 2006 IPCC Guidelines (vol. 2, chap. 4.1.4.2, p.4.18) and clear information on the procedures for developing and verifying the country-specific CH_4 EFs for this subcategory in order to justify that they were developed in a manner consistent with the 2006 IPCC Guidelines and are considered more accurate than the IPCC default values, in accordance with paragraph 12 of the UNFCCC Annex I inventory reporting guidelines.	Not resolved. The Party did not include in its NIR an explanation for the differences between the country-specific CH_4 EFs for subcategory 1.B.1.a.ii (surface mines) reported in NIR table 3.30 (p.92) and the corresponding default values from the 2006 IPCC Guidelines (vol. 2, chap. 4.1.4.2, p.4.18). During the review, the Party clarified that it is working on developing and revising country-specific EFs for subcategory 1.B.1.a.2.i (surface coal mining) and will provide relevant information and explanations in the NIR after their implementation in the inventory.
E.12	1.B.2.a Oil – liquid fuels – CH_4 (E.15, 2020) (E.21, 2018) Accuracy	(a) Use the developed and verified national EFs for subcategory 1.B.2.a (oil) for the parts of the time series for which they are applicable, provided that it is demonstrated that they were developed in a manner consistent with the 2006 IPCC Guidelines and in accordance with paragraph 12 of the UNFCCC Annex I inventory reporting guidelines (e.g. by documenting in detail in the NIR how these EFs were developed and the results of the verification procedures performed); or, if	(a) Not resolved. The Party did not use country-specific EFs for all subcategories under category 1.B.2.a (oil). It reported in the NIR (p.97) that the EFs used for estimating emissions from oil operations were the average of the default values for developed countries provided in the 2006 IPCC Guidelines (vol. 2, chap. 4, table 4.2.4, pp.4.48–4.54) and explained why it considered that these default EFs are appropriate to its national circumstances (p.99). The Party also reported in its NIR (p.99) that it is currently developing country-specific EFs, which will be used instead of the default IPCC values for developed countries in the future. Similar

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		this cannot be done in time for the next annual submission, include a description of the development of country-specific EFs for oil systems and explain why they cannot be used for that submission; (b) If the default EFs from table 4.2.4 are used instead of data from table 4.2.5 of volume 2 of the 2006 IPCC Guidelines, include a detailed explanation of why these default EFs are considered more appropriate to the specific national circumstances of the Russian Federation and explain for which parts of the time series these EFs were used, in accordance with paragraph 12 of the UNFCCC Annex I inventory reporting guidelines.	information on the development of country-specific EFs was provided in the 2020 NIR (annex 3.6). The current NIR does not include additional information or a description of the development of country-specific EFs for the oil systems and the years they will cover or an explanation as to why they cannot be used in the submission. During the review, the Party clarified that it is working on the development and improvement of the country-specific EFs for category 1.B.2.a.2 (oil production) and it will include relevant information in the next submission. (b) Resolved. As it is not yet possible for the Party to use country-specific EFs for all subcategories under category 1.B.2.a (oil) for the years of the time series for which they are applicable, the Party reported in the NIR (p.97) that the EFs used for estimating emissions from oil operations were the average of the default values for developed countries provided in the 2006 IPCC Guidelines (vol. 2, chap. 4, table 4.2.4, pp.4.48–4.54) and provided an explanation (p.99) of why it considered that these default EFs are appropriate to its national circumstances. The ERT noted that the default EFs were applied consistently across the time series.
E.13	1.B.2.a Oil – liquid fuels – CO_2 and CH_4 (E.16, 2020) (E.22, 2018) Transparency	Add a new column in NIR table 3.34 to indicate clearly the sources of each of the EFs used for emission estimates for each subcategory under 1.B.2.a (oil).	Resolved. Although the Party did not add a new column to NIR table 3.38 (p.98) (which corresponds to NIR table 3.34 of the 2018 annual submission), it indicated the sources of the EFs used for emission estimates for each subcategory under 1.B.2.a (oil) in the NIR (p.97). The Party indicated that the EFs used for estimating emissions from oil operations were the default values for developed countries from table 4.2.4 of the 2006 IPCC Guidelines (vol. 2, chap. 4, pp.4.48–4.54) and explained why it considered that these default EFs are appropriate to its national circumstances. The Party also included a reference in the table title and a footnote under NIR table 3.38 explaining that the CH_4, CO_2 and NMVOC EFs for the production of oil and condensate and for oil refining reported in the table are the average of the range of the default values from the 2006 IPCC Guidelines.
E.14	1.B.2.b Natural gas – gaseous fuels – CO_2 and CH_4 (E.18, 2020) (E.23, 2018) Transparency	(a) Revise the relevant text in the NIR to reflect the improvement in the development and use of country-specific EFs in estimates for the subcategories under 1.B.2.b (natural gas); (b) Add a new column in NIR table 3.35 to show clearly the source of each EF used for estimates of emissions for the subcategories under 1.B.2.b (natural gas).	(a) Resolved. The Party revised in its NIR (pp.95–97) the relevant text to reflect the improvement in the development and use of country-specific EFs for the subcategories under 1.B.2.b (natural gas). For the subcategories 1.B.2.b.2 gas production, 1.B.2.b.3 gas processing, 1.B.2.b.4 gas transmission and 1.B.2.c.ii gas flaring, the Party reported that country-specific EFs have been developed for groups of operations as the peculiarities of operations of the Russian gas industry do not allow the development of country-specific EFs for specific operations (e.g. gas production and gas processing). The Party reported in its NIR that default EFs for fugitive emissions from oil and gas operations in developed

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			countries from the 2006 IPCC Guidelines (vol. 2, chap. 4, table 4.2.4, pp.4.48–4.54) were used for the rest of the subcategories under 1.B.2.b. (b) Addressing. The Party included a new column in NIR table 3.35 and listed in that column a source for each country-specific EF used for estimates of emissions for the subcategories under 1.B.2.b (natural gas). However, the ERT noted that although the same sources for EFs were reported as in the previous NIR, the values of EFs reported in NIR table 3.35 were different (e.g. a higher value for the CO_2 EF for gas production and gas processing was reported in the 2023 NIR compared with that in the 2020 NIR; a higher value for the CO_2 EF and a lower value for the CH_4 EF for flaring were reported in the 2023 NIR compared with those in the 2020 NIR; and a new value for the CH_4 EF for gas transmission was introduced). During the review, the Party referred to NIR table 3.35 and provided specific references to the data sources, including to a document not mentioned in the table. The ERT considers that the recommendation has not yet been fully addressed because the Party provided in NIR table 3.35 the references for the same sources for each country-specific EF used for estimates of emissions for the subcategories under 1.B.2.b (natural gas) as in the previous NIR without explaining the updates to the values of the country-specific EFs compared with the values reported in the 2020 NIR, including providing page references to the values used or adding the latest reference document (from 2022) provided during the review.
E.15	1.B.2.b Natural gas – gaseous fuels – CO_2 and CH_4 (E.19, 2020) (E.24, 2018) Transparency	Include in the NIR a clear description of the inclusion of fugitive emissions from transmission of natural gas in transit.	Resolved. The Party reported in its NIR (p.94) that statistical data on the transmission of natural gas include both natural gas produced in the Russian Federation and natural gas produced in neighbouring countries and transmitted via the territory of the Russian Federation.
E.16	1.B.2.b Natural gas – gaseous fuels – CO_2 and CH_4 (E.20, 2020) (E.25, 2018) Accuracy	Provide a clear justification and/or verification information in the NIR on the applicability of the country-specific CH_4 and CO_2 EFs for fugitive emissions from gas transmission, including information on the period of the time series for which they apply, in order to justify that they were developed in a manner consistent with the 2006 IPCC Guidelines and are considered to be more accurate than the IPCC defaults, in accordance with paragraph 12 of the UNFCCC Annex I inventory reporting guidelines.	Addressing. The ERT noted a significant recalculation of CH_4 emissions from gas transmission for 2001–2018 since the 2020 submission and a reduction in the CH_4 IEF (i.e. of 71.0 per cent in 2018). The Party did not provide in its NIR a clear justification for and/or verification information on the applicability of these country-specific CH_4 and CO_2 EFs for fugitive emissions from gas transmission across the time series. During the review, the Party referred to a publication in which a justification and additional information on the applicability of developed country-specific EFs for natural gas transmission can be found. The Party also clarified that the CH_4 EF from Uvarova et al. (2017) is based on data on gas transmission systems obtained before 2000 (Dedikov et al., 1999). The EF from Bondur et al. (2022) is based on data obtained from Gazprom (the

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			single operator of the Russian gas transmission system) for 2015–2018. The first EF was used for estimating CH_4 emissions from the transmission of natural gas for the years of the time series before 2000, and the second EF was used from 2017, with interpolation of the EF value for 2000–2017. The use of these two national EFs reflects changes in the technical development and modernization of the gas transmission system implemented by Gazprom from 2000 onward. The Party indicated that it will continue improving the text of the NIR for the next submission. While noting the efforts made to improve the country-specific EFs for the subcategory, the ERT considers that the recommendation has not yet been addressed because the Party has not yet provided in its NIR a clear justification for and/or verification information on the applicability of the country-specific CH_4 and CO_2 EFs for fugitive emissions from gas transmission, including information on the period of the time series to which they apply, in order to justify that they were developed in a manner consistent with the 2006 IPCC Guidelines and are considered to be more accurate than the IPCC defaults, in accordance with paragraph 12 of the UNFCCC Annex I inventory reporting guidelines. The ERT also noted that the Party, while providing a reference for the source of each country-specific EF used for estimates of emissions for the subcategories under 1.B.2.b (natural gas) (NIR table 3.35, p.96), has changed the values of these country-specific EFs compared with the values reported in the 2020 NIR, where the same reference sources for country-specific EFs were reported (see ID# E.14 above).
E.17	1.B.2.b Natural gas – gaseous fuels – CO_2 and CH_4 (E.22, 2020) (E.27, 2018) Accuracy	(a) Provide a clear justification and/or verification information in the NIR on the applicability of the country-specific CH_4 and CO_2 EFs for fugitive emissions from gas production and processing activities, as well as for flaring emissions in these activities, in order to justify that the EFs were developed in a manner consistent with the 2006 IPCC Guidelines, in accordance with paragraph 12 of the UNFCCC Annex I inventory reporting guidelines; (b) In particular, clarify, justify and report in the NIR on the significant differences of the country-specific EFs used in the estimates of emissions from gas production and processing compared with the default EFs from table 4.2.4 and/or 4.2.5 of the 2006 IPCC Guidelines (vol. 2), and in general clarify and justify that the country-specific CH_4 and CO_2 EFs used in the estimates of emissions from gas production and processing are considered to be	(a) Addressing. The Party reported in its NIR (pp.95–96) on the use of the country-specific CH_4 and CO_2 EFs for estimating fugitive emissions from natural gas production and processing activities, as well as for flaring emissions under these activities. The ERT noted only minor revisions to the CO_2 IEF for gas production compared with the IEF in the 2020 submission. The Party indicated in its NIR (p.95) its overall goal of developing country-specific EFs using national literature sources and sectoral data in order to increase the accuracy of GHG emission estimates; however, it did not provide a clear justification for and/or verification information on their applicability in order to justify that the EFs were developed in a manner consistent with the 2006 IPCC Guidelines, in accordance with paragraph 12 of the UNFCCC Annex I inventory reporting guidelines. During the review, the Party clarified that further explanation and justification will be included in the NIR of the next submission. (b) Not resolved. The Party did not clarify, justify and report on in the NIR the significant differences in the country-specific EFs used in

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		more accurate than the default values from the 2006 IPCC Guidelines.	estimating emissions from gas production and processing compared with the default EFs from table 4.2.4 and/or 4.2.5 of the 2006 IPCC Guidelines (vol. 2, chap. 4) and did not clarify that the country-specific CH_4 and CO_2 EFs used in estimating emissions from gas production and processing are considered to be more accurate than the default values from the 2006 IPCC Guidelines. During the review, the Party clarified that further explanation and justification will be included in the NIR of the next submission.
E.18	1.B.2.b Natural gas – gaseous fuels – CO_2 and CH_4 (E.23, 2020) (E.28, 2018) Transparency	Include explicit descriptions in the NIR and CRF table 9 that explain under which categories are reported the CO_2 and CH_4 emissions for subcategories 1.B.2.b.3 (natural gas – processing) and 1.B.2.c.ii (venting gas), for which the notation key "IE" is used.	Addressing. The Party included in the documentation box of CRF table 1.B.2 and in CRF table 9 the subcategories under which CO_2 and CH_4 emissions for subcategories 1.B.2.b.3 (natural gas – processing) and 1.B.2.c.ii (venting gas) were reported, for which the notation key "IE" was used. However, explanatory information is not included in the NIR, except for a statement that the Party was unable to report disaggregated information for the subcategories. During the review, the Party referred to the explanations provided in CRF table 9, in NIR section 3.3.3.2 (p.95) and as comments to NIR table 3.35 (p.96). The ERT considers that the recommendation has not yet been fully addressed because the Party has not yet clarified in the NIR under which categories the CO_2 and CH_4 emissions for subcategories 1.B.2.b.3 and 1.B.2.c.ii, for which "IE" is used in CRF table 1.B.2, are reported.
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I.1	2.A.3 Glass production – CO_2 (I.3, 2020) (I.15, 2018) Accuracy	Estimate the use of soda ash in the glass production industry and subtract it from the AD used for the estimation of CO_2 emissions from soda ash use under category 2.A.4.b in order to avoid double counting of CO_2 emissions.	Resolved. The Party revised its calculations to ensure that the AD for soda ash used in the glass production industry are subtracted from total soda ash use in order to align with the 2006 IPCC Guidelines (vol. 3, chap. 2.4.1.4, p.2.31) and provided the corresponding explanation in its NIR (pp.109–110). The Party reported in NIR table 4.11 (p.109) the amount of soda ash used in glass production and the methodology applied to estimate emissions under category 2.A.4.b to avoid double counting. The ERT noted that the Russian Federation reported the AD on soda ash use in category 2.A.4.b in CRF table 2(I).A-Hs1 without the use of soda ash for glass production reported under category 2.A.3.
I.2	2.A.4 Other process uses of carbonates – CO_2 (I.16, 2020) Comparability	Clarify in the NIR which soda ash uses in the country are emissive and which are not, build the capacity needed to collect information on soda ash consumption for the respective end-use categories where soda ash is potentially used (e.g. chemicals, pulp and paper, non-ferrous and ferrous metallurgy, food, petrochemical and oil refining) and estimate and report CO_2 emissions from these applications under the respective end-use	Resolved. The Party reported aggregated information on CO_2 emissions from all soda ash uses in all industries, except for glass production, using the tier 1 method under subcategory 2.A.4.b (CRF table 2(I).A-Hs1). The Party provided information on the AD, allocation and assumptions used for the estimates in the NIR (p.109). The Party did not report in the NIR on the potential end users of soda ash in different industries (e.g. chemicals, pulp and paper, non-ferrous metal and ferrous metallurgy, food, petrochemicals and oil refining) and if they are emissive, with the

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		categories in the CRF tables in accordance with the 2006 IPCC Guidelines (vol. 3, chap. 2.5.1, p.2.33), as well as include transparent information in the NIR on the AD and method used for the estimation and allocation of emissions.	corresponding AD. During the review, the Party clarified that the data on soda ash used in different industries and applications are not collected under the national statistical system or by the industry's professional associations. The Party also pointed out the small contribution of this subcategory (e.g. in 2019, the total CO_2 emissions from soda ash use in various applications, excluding soda ash use in glass production, were only 338 Gg) and the limited resources to further elaborate the estimates for this non-key category. Noting that this is not a key category and taking into account the national context and the inability of the Russian Federation to collect AD from all the numerous small users of soda ash in the different industries not covered by the national statistics, the ERT agrees with the justification provided and considers this issue resolved.
I.3	2.B.1 Ammonia production – CO_2 (I.4, 2020) (I.16, 2018) Accuracy	Estimate CO_2 emissions from ammonia production by using a COF parameter obtained from producers or from country-specific energy sector information that is consistent with the 2006 IPCC Guidelines.	Resolved. The Party reported in its NIR (p.117) on the methodology applied to estimate CO_2 emissions from ammonia production, which is tier 2 and not tier 3, as reported by mistake in the previous submission. According to the NIR (p.117), and as confirmed during the review, the COF value used was 1, which is the default value of the 2006 IPCC Guidelines (vol. 2, chap. 1.4.2, table 1.4, p.1.23). The ERT considers that the recommendation has been fully addressed because for the methodology applied, the use of a default COF is in line with 2006 IPCC Guidelines, which suggest that when using the tier 2 method the COF value may be obtained from the default values shown in table 3.1 of the 2006 IPCC Guidelines (vol. 3, chap. 3.2.2.1, p.3.13).
I.4	2.B.1 Ammonia production 2.D.3 Other (non-energy products from fuels and solvent use) – CO_2 (I.10, 2020), (I.10, 2018) (I.15, 2017) Completeness	Provide an estimate for urea use in selective catalytic reduction (under category 2.D.3) using diesel consumption in road transportation and applying equation 3.2.2 from the 2006 IPCC Guidelines (vol. 2, chap. 3.2.1.1, p.3.12). In case emissions are insignificant, provide a justification for their exclusion in terms of the likely level of emissions, in accordance with the requirements in paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines.	Resolved. The Party estimated emissions from urea use in selective catalytic reduction using diesel consumption in road transportation by applying the tier 1 method and equation 3.2.2 from the 2006 IPCC Guidelines (vol. 2, chap. 3.2.1.1, p.3.12). The Russian Federation reported in its NIR (p.147) and in CRF table 2(I).A-Hs2 (under subcategory 2.D.3) CO_2 emissions from the use of urea in selective catalytic reduction in road transportation.
I.5	2.B.1 Ammonia production 2.D.3 Other (non-energy products from fuels and solvent use) – CO_2 (I.11, 2020) (I.11, 2018) (I.15, 2017) Transparency	Provide in the NIR a better explanation of which categories' CO_2 emissions from significant uses of urea are reported, including the provision of data on export/import of urea (e.g. as a trade balance).	Addressing. The Party provided additional information on significant uses of urea in section 5.7.4 (p.217) of the agriculture chapter of the NIR, including for various types of resins and adhesives, plastics and synthetic materials, chemical production, explosives produced from ammonium nitrate, food additives, the production of chewing gum and the cleaning up of emissions from thermal power plants and waste incinerators. However, the Party did not include specific information on urea exports or imports.

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			During the review, the Party clarified that national statistics and the industry's professional associations cannot provide sufficient data for the development of a trade balance for urea, since urea is both exported and imported, as well as used as a component of other products, in particular mineral fertilizers. The ERT noted that data on the production, import and export of urea are available in FAOSTAT, which may be used to develop the mass trade balance of urea.
I.6	2.B.8 Petrochemical and carbon black production – CO_2 (I.17, 2020) Accuracy	Use higher-tier estimation methods with country-specific EFs to estimate CO_2 emissions for subcategories 2.B.8.a (methanol), 2.B.8.b (ethylene) and 2.B.8.f (carbon black), as required by the 2006 IPCC Guidelines (vol. 3, chap. 3.9.2.1, pp.3.63–3.65).	Addressing. The Party continued to estimate CO_2 emissions for category 2.B.8 (petrochemical and carbon black production) using the tier 1 methodology from the 2006 IPCC Guidelines (vol. 3, chap. 3.9.2.1, pp.3.65–3.66), as explained in the NIR (p.122). The Party did not report in its NIR on plans to use a higher-tier methodology to estimate CO_2 emissions from petrochemical and carbon black production. During the review, the Russian Federation clarified that national EFs for the petrochemical industries (methanol production, ethylene production and carbon black production) are under development to enable the use of a higher-tier methodology for future inventories. The Party clarified that it is using the mass balance approach in line with the 2006 IPCC Guidelines to develop national EFs for the petrochemical industries by collecting data from producers. The Russian Federation plans to use the country-specific CO_2 EFs to estimate CO_2 emissions for subcategories 2.B.8.a (methanol), 2.B.8.b (ethylene) and 2.B.8.f (carbon black) for its next submission.
I.7	2.B.8 Petrochemical and carbon black production – CO_2 (I.17, 2020) Transparency	Include in the NIR a clear description of the methods, AD and EFs used for estimating emissions for category 2.B.8 (petrochemical and carbon black production), in particular for those subcategories estimated using higher tiers, and indicate which subcategories' emissions are estimated using the relevant default assumptions from the 2006 IPCC Guidelines (vol. 3, chap. 3.9.2.2, table 3.11, p.3.72), which country-specific technological processes take place in the country and which feedstocks are used for category 2.B.8 (petrochemical and carbon black production).	Addressing. The Party reported in the NIR (pp.122–123) on the AD and EFs used for estimating emissions for category 2.B.8 (petrochemical and carbon black production) for all products (methanol, ethylene, vinyl chloride, ethylene oxide, acrylonitrile, carbon black) and described data collection and completeness. However, the Party did not report on country-specific technological processes occurring in the country and feedstocks used under this category. The Party also did not apply higher-tier methods for this submission (see ID# I.6 above), therefore, it could not include information for those subcategories' estimates, as recommended. During the review, the Party clarified that work is in progress to develop country-specific EFs (see ID# I.6 above). The Party is planning to include relevant information on the country-specific technological processes in the NIR after the introduction of higher-tier methods to the inventory.
I.8	2.B.10 Other (chemical industry) – CO_2	Estimate and report CO_2 emissions associated with hydrogen production following the guidance of the 2006 IPCC Guidelines and include in the NIR all background	Resolved. The Party estimated emissions from hydrogen production using the tier 1a methodology in accordance with the 2019 Refinement to the 2006 IPCC Guidelines (vol. 3, chap.3.11) and reported in its NIR (pp.129–131) and CRF table2(I).A-Hs1 under category 2.B.10 on CO_2

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	(I.7, 2020) (I.19, 2018) Completeness	information on method, parameters and data used for the estimation.	emissions from hydrogen production by natural gas conversion technology. All hydrogen production processes in use in the Russian Federation, as well as the methodology and parameters used, are reported in the NIR (pp.129–131).
I.9	2.D Non-energy products from fuels and solvent use – CO_2 (I.8, 2020) (I.9, 2018) (I.7, 2017) (I.13, 2016) (I.13, 2015) Accuracy	Investigate and, as appropriate, resolve the discrepancy in reporting the CO_2 emissions from the NEU of fuels excluded from the energy sector (indicated as reported under non-energy products from fuels and solvent use in CRF table 1.A(d)) and those actually reported in the inventory in the IPPU sector under category 2.D (non-energy products from fuels and solvent use in CRF table 2(I).A-Hs2); and explain the reporting of NEU for the category 2.D in the NIR.	Not resolved. The Party did not resolve the discrepancy in reporting the CO_2 emissions from the NEU of fuels excluded from the energy sector between those indicated as reported under non-energy products from fuels and solvent use in CRF table 1.A(d) and those actually reported in CRF table 2(I).A-Hs2. It reported 1,501.15 kt CO_2 for the NEU of lubricants in CRF table 1.A(d) for 2021 and 2,215.29 kt CO_2 from lubricant consumption under category 2.D.1 (lubricant use) in CRF table 2(I).A-Hs2 for 2021. The Party did not provide an explanation of this discrepancy in its NIR. During the review, the Party clarified that a mistake was made in CRF table 1.A(d), which will be corrected in the next submission.
I.10	2.D Non-energy products from fuels and solvent use – CO_2 (I.9, 2020) (I.20, 2018) Convention reporting adherence	Report data in CRF table 1.A(d) in line with the UNFCCC Annex I inventory reporting guidelines, in particular regarding the NEU of fuels that may be partly or may not be emissive and also report the related data and information in the columns "CO_2 emissions from the NEU reported in the inventory" and "Reported under:…".	Addressing. The Party reported in CRF table 1.A(d) under the column "CO_2 emissions from the NEU reported in the inventory" and "Reported under:…" on LPG, petroleum coke, lubricants, naphtha, bitumen and other bituminous coke. For coking coal, for which AD were reported in CRF table 1.A(d) in the previous reviewed submission without associated CO_2 emissions, "NA" was reported for both AD and emissions for the entire time series. The ERT noted that there are no explanations in the NIR regarding whether NEU of coking coal exists in the Russian Federation and regarding the discrepancy in the quantity of CO_2 emissions from the NEU of lubricants between the energy and IPPU sectors (see ID# I.9 above). During the review, the Russian Federation clarified that there is no NEU of coking coal and clarified that the errors in CRF table 1.A(d) will be corrected in the next submission.
I.11	2.E Electronics industry – HFCs, PFCs, SF_6 and NF_3 (I.12, 2020) (I.21, 2018) Completeness	Improve the accuracy of the emission estimates of fluorinated gases (HFCs, PFCs, SF_6 and NF_3) for category 2.E (electronics industry) in accordance with the 2006 IPCC Guidelines, ensure completeness of the estimates by covering all relevant activities occurring in the Russian Federation under this category, including PFC emissions from heat transfer fluids, and report in the NIR about progress in collecting AD for the complete and reliable implementation of the methodologies of the 2006 IPCC Guidelines.	Not resolved. The Party did not report in its NIR (pp.150–153) an overview or a description of all possible sources under the category (2.E) in the country, including heat transfer fluids, and the cells for the emissions from heat transfer fluids were left blank in CRF table 2(II). Owing to the lack of reliable input data, emissions from the production of semiconductor microcircuits and liquid-crystal displays continued to be reported in aggregate, no recalculations were made for the category since the 2020 submission and no improvements were made in accuracy through improved AD collection or disaggregation of semiconductor and liquid-crystal display manufacturing (the EFs for semiconductor

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			manufacturing in table 6.3 of the 2006 IPCC Guidelines (vol. 3, chap. 6.2.2.1, p.6.17) continue to be used for both). During the review, the Party clarified that, owing to the necessity to prioritize available resources, a study and data collection for the category are planned for after 2025.
I.12	2.E.1 Integrated circuit or semiconductor – PFCs (I.18, 2020) Convention reporting adherence	Revise for the next annual submission the value of c-C_4F_8 consumption (AD) for 2018 in CRF table 2(II).B-Hs1 under category 2.E.1 (integrated circuit or semiconductor) and implement or enhance the appropriate QC procedures to avoid such errors in the future.	Resolved. The Party revised the value of c-C_4F_8 consumption (AD) for 2018 in CRF table 2(II).B-Hs1 under category 2.E.1 (integrated circuit or semiconductor), resulting in the correction of the respective IEF (from 3.83 to 9.00 kg/t), which suggested improved QC procedures. The AD are now consistent across the time series.
I.13	2.E.2 Thin-film transistor flat panel display – HFCs, PFCs, SF_6 and NF_3 (I.19, 2020) Transparency	Report in CRF table 9, CRF table 2(II).B-Hs1 and the NIR clear and consistent information on the use of notation keys and allocation of all HFC emissions (and PFC, SF_6 and NF_3 emissions, if relevant) under category 2.E.2 (thin-film transistor flat panel display).	Not resolved. The Party continued to report HFC emissions for this category as "IE". Neither the NIR (pp.150–153) nor CRF table 9 includes information on the use of the notation key. CRF table 2(II).B-Hs2 also does not contain information on notation key use and allocation of HFC emissions (and PFC, SF_6 and NF_3 emissions, when relevant) under category 2.E.2 (thin-film transistor flat panel display). During the review, the Party stated that it will include the required explanations in the next NIR and CRF tables.
I.14	2.F.1 Refrigeration and air conditioning – HFCs (I.14, 2020) (I.23, 2018) Completeness	Provide information and documentation in the NIR on the use of fluorinated gases, in particular HFCs, under subcategory 2.F.1.d (transport refrigeration) and on whether the associated emissions are estimated and included in the national GHG inventory and, if relevant, estimate and report emissions from the use of HFCs in transport refrigeration or use the appropriate notation keys.	Resolved. The Party provided information on the use of HFCs in transport refrigeration and clarified in its NIR (p.157) that the HFC emissions for subcategory 2.F.1.d (transport refrigeration) were reported under subcategory 2.F.1.c (industrial refrigeration). The notation key "IE" is now reported in CRF table 2(II).B-Hs2 and explained in CRF table 9.
I.15	2.F.1 Refrigeration and air conditioning – HFCs and PFCs (I.20, 2020) Transparency	Report in the NIR and CRF table 9, and, if possible, in the documentation box to CRF table 2(II).B-Hs2 clear and consistent information on and explanations of the notation keys used and allocation of emissions of HFC-23, HFC-152a and PFC-218 from manufacturing under subcategory 2.F.1.c (industrial refrigeration).	Addressing. The Party reported emissions of HFC-23, HFC-152a and PFC-218 from manufacturing under subcategory 2.F.1.c (industrial refrigeration) in CRF table 2(II).B-Hs2 as "IE" for the relevant emissions reported under stocks and updated CRF table 9 accordingly, as also clarified during the review. However, the AD for the HFC-152a and PFC-218 emissions ("filled into new manufactured products") are reported as "NO". There is no explanation for this discrepancy in the NIR.
I.16	2.F.1 Refrigeration and air conditioning – HFCs (I.21, 2020) Transparency	Use the appropriate notation keys for subcategory 2.F.1.d (transport refrigeration) in CRF table 2(II).B-Hs2 and report in the NIR and CRF table 9 clear and consistent information on and explanations of the notation keys	Resolved. The Party reported in CRF table 2(II).B-Hs2 "IE" for emissions for subcategory 2.F.1.d (transport refrigeration) and explained in CRF table 9 and in the NIR (p.157) that emissions are reported under subcategory 2.F.1.c (industrial refrigeration).

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		used and allocation of HFC emissions under this subcategory.	
I.17	2.F.5 Solvents – HFCs (I.22, 2020) Transparency	Clearly explain in CRF table 9 use of the notation key "NE" for HFC-245fa emissions under category 2.F.5 (solvents), consistently with the explanation reported in the NIR, and include in the documentation box to CRF table 2(II).B-Hs2 a relevant reference to the section of the NIR where this explanation is provided.	Not resolved. In its NIR (p.165) the Party provided information on the use of "NE" for HFC-245fa emissions under category 2.F.5 (solvents), explaining that such emissions are considered to be insignificant. The Party did not provide an explanation in the appropriate CRF tables (table 2(II).B-Hs2 and table 9). During the review, the Party stated that relevant information will be included in the documentation box to CRF table 2(II).B-Hs2 and in CRF table 9 of the next submission.
I.18	2.G.2 SF_6 and PFCs from other product use – SF_6 (I.23, 2020) Transparency	Include in the NIR relevant information and documentation justifying the use of the notation key "NO" for SF_6 emissions for subcategory 2.G.2.a (military applications).	Addressing. The Party reported in its NIR (p.167) information on the use of "NO" for SF_6 emissions for subcategory 2.G.2.a (military applications), stating the same information as in the 2020 NIR, namely, that it does not use SF_6 for long-range radar detection and control aircraft. However, the Party did not add any further information supporting this statement in the NIR. During the review, the Party clarified that the State corporation responsible for weapons and military applications does not use SF_6 in its products. The Party stated that there are no imports of weapons and military equipment into the country, therefore there are also no emissions resulting from the use of imported products. The ERT considers that the Party could add the information provided during the review to the NIR to resolve the issue.
I.19	2.G.2 SF_6 and PFCs from other product use – PFCs and SF_6 (I.25, 2020) Completeness	Investigate whether PFC or SF_6 emissions occur in the country under subcategories 2.G.2.c (sound-proof windows), 2.G.2.d (adiabatic properties: shoes and tyres) and 2.G.2.e (other) from activities defined in the 2006 IPCC Guidelines (vol. 3, chap. 8.3.1, p.8.23), report this information in the NIR, and, if occurring, estimate and report emissions from these activities as recommended by the 2006 IPCC Guidelines, including information in the NIR on methods, AD and EFs used.	Addressing. The Party did not provide information in the NIR on the occurrence of activities in the country that use PFCs or SF_6 under subcategories 2.G.2.c (sound-proof windows), 2.G.2.d (adiabatic properties: shoes and tyres) or 2.G.2.e (other) (e.g. PFCs used as heat transfer fluids in commercial and consumer applications, gas-air tracers in research and leak detectors), as requested in the 2006 IPCC Guidelines (vol. 3, chap. 8.3.1, p.8.23). The Party did not provide an explanation of the national circumstances affecting these potential emissions sources or references to studies or other sources on the lack of such emissions. During the review, the Party explained the use of notation key "NO" by stating that it found no evidence of SF_6 being used in the country. Additionally, the Party stated that it performed an analysis of publications on the Internet several times in 2008–2022 with the aim of collecting data on the production or use of goods or equipment under the above-mentioned subcategories, without finding any evidence of such production or use.

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			The ERT considers that the recommendation has not yet been fully addressed as the information provided during the review on the research conducted was not reported in the NIR.
Agriculture			
A.1	3. General (agriculture) – CH_4 and N_2O (A.2, 2020) (A.12, 2018) Transparency	Include in the NIR descriptions of the methodology used to generate the statistics on amount of feed units consumed by animals for enterprises, private farms and households, and during grazing.	Resolved. The Party provided in its NIR (pp.177–178) a detailed description of the methodology used, with references to the federal statistical guiding documents describing the approaches to collecting statistical data on the amount of feed units consumed by cattle and swine for different type of farms, including agricultural enterprises, private farms and households, and during grazing. Also, the Party reported in its NIR (pp.177–178) information on how statistical data on feed units consumed were used for calculations of GHG emissions.
A.2	3.A Enteric fermentation 3.B Manure management 3.D Direct and indirect N_2O emissions from agricultural soils – CH_4 and N_2O (A.4, 2020) (A.14, 2018) Convention reporting adherence	(a) Perform QC checks at the disaggregated level (i.e. regions) to ensure that the feed intake in kg of dry mass does not exceed 3 per cent of the body mass in ruminants; (b) To avoid false conclusions, evaluate the current food intake limits for dairy cattle (3 per cent) that are used for performing the QC checks to determine whether a higher percentage may be more appropriate (e.g. 4 per cent).	(a) Addressing. The Party reported in the NIR (p.187) on the specific QC checks performed for enteric fermentation, including QC checks carried out for cattle that demonstrate that the amount of feed intake in kg of dry mass does not exceed 3 per cent of mass for each year of the entire time series. However, the level of checks (regional or country) was not indicated in the NIR and the results were not discussed, neither for the regional level nor for the country level, in the NIR. During the review, the Russian Federation confirmed that the QC checks were performed at the regional level. However, as the Party did not provide a calculation sheet, the ERT was not able to verify the checks made. (b) Not resolved. The ERT noted that the evaluation results were not discussed, neither for the regional level nor for the country level, in the NIR. During the review, the Party clarified that an evaluation of the calculation results of the current feeding rates is included in the improvement plan for the sector.
A.3	3.A.1 Cattle 3.B.1 Cattle 3.D.a Direct N_2O emissions from managed soils – CH_4 and N_2O (A.5, 2020) (A.15, 2018) Accuracy	Further investigate and clearly justify in the NIR the GE values estimated from the feed unit statistics. If it turns out that feed intake levels are considered unreasonable, carefully examine the cause of the error and make the necessary adjustments in the inventory for all categories affected by the error, revise the related estimates and describe in the NIR the new assumptions made.	Resolved. The Party changed the national methodology for calculating GE values both for dairy and for non-dairy cattle to tier 2 (2006 IPCC Guidelines, vol. 4, chap. 10, equation 10.16, p.10.21) and made relevant recalculations for CH_4 and N_2O emissions in the 2021 GHG inventory submission. The Party continued to estimate GE values for dairy and non-dairy cattle by using the same tier 2 methodology in the 2023 submission. The Russian Federation reported in the NIR (annex 3.1, tables 1.3.8–1.3.9) data on GE calculated at the regional level. According to the above-mentioned updated calculations, GE values for 2021 vary depending on productivity between 154.2 and 259.3 MJ/day, with an average country level of 226.7 MJ/day, for dairy cattle, and between 54.5 and 153.4 MJ/day, with an average country level of 134.5 MJ/day, for non-dairy cattle. The ERT noted the recalculations made by the Russian Federation

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			to improve the accuracy of the CH_4 and N_2O emission estimates and concluded that, aggregated at the country level, the GE values for cattle are within the range of reporting by Parties included in Annex I to the Convention (143.8–426.5 MJ/day for dairy cattle and 92.2–179.9 MJ/day for non-dairy cattle). Therefore, the accuracy issue is resolved. For pending issues related to the description of the assumption and parameters applied in the calculation of the GE for cattle in the NIR and CRF tables, see ID# A.15 in table 5.
A.4	3.A.1 Cattle 3.B.1 Cattle 3.D.a Direct N_2O emissions from managed soils – CH_4 and N_2O (A.6, 2020) (A.16, 2018) Accuracy	Revise the accuracy of the AD and, if appropriate, recalculate the corresponding emission estimates of CH_4 and N_2O for non-dairy cattle. Alternatively, include in the NIR clear explanations for the observed decreases in the values for GE, VS daily excretion and Nex between 2015 and 2016.	Resolved. The Party changed the national methodology for calculating GE values for non-dairy cattle (see ID# A.3 above) and made relevant recalculations, which also revised the VS and Nex rates compared with those in the 2020 submission. Based on the recalculations, the ERT noted that there were no unusual inter-annual fluctuations in GE, VS and Nex values for non-dairy cattle between 2015 and 2016, which decreased in this period by 0.35, 0.45 and 0.04 per cent respectively.
A.5	3.A.1 Cattle 3.B.1 Cattle 3.D.a Direct N_2O emissions from managed soils – CH_4 and N_2O (A.14, 2020) Transparency	Provide in the NIR a dimensional analysis of equation 5.1 used to estimate GE with the aim of examining and confirming the relationship between different physical quantities in the equation and measurement units, and show how these dimensions are tracked when performing calculations.	Resolved. The Party changed the methodology for estimating GE values from a national method to the IPCC tier 2 method (see ID#s A.3–A.4 above). Equation 5.1 of the NIR has not been used for cattle since the 2021 GHG inventory submission.
A.6	3.A.1 Cattle 3.B.1 Cattle 3.D.a Direct N_2O emissions from managed soils – CH_4 and N_2O (A.14, 2020) Transparency	Provide clear information in the NIR demonstrating consistency of the country-specific method for estimating CH_4 emissions from dairy and non-dairy cattle with the tier 2 method from the 2006 IPCC Guidelines, including in particular a calculation of GE that follows the method from the 2006 IPCC Guidelines based on net energy components (vol. 4, chap. 10.2.2, equation 10.16, p.10.21), an analysis of the relationship between GE and the feed unit used in the country-specific method, and information on the sum of the net energy used by cattle.	Resolved. The Party changed the methodology for estimating GE values from a national method to the IPCC tier 2 method (see ID#s A.3–A.4 above), and the national methodology reflected in equation 5.1 of the NIR used in previous submissions has not been used since the 2021 GHG inventory submission.
A.7	3.A.1 Cattle 3.B.1 Cattle 3.D.a Direct N_2O emissions from managed soils – CH_4 and N_2O (A.14, 2020) Transparency	Provide in the NIR an analysis of the relationship between GE, CH_4 EFs and milk yield for the most relevant regions of the country, and for the Moscow and Leningrad Regions at a minimum.	Not resolved. The ERT noted significant inter-annual changes in CH_4 EFs for dairy and non-dairy cattle for most of the regions in the estimates calculated using the updated methodology for dairy and non-dairy cattle (see ID# A.3 above) reported in the NIR for 2005–2021 (annex 3.1, tables 1.3.8–1.3.9), but the Party did not provide an analysis of the relationship between GE, CH_4 EFs and milk yield for the most relevant regions of the country in the NIR. Between 2000 and 2001, the lowest inter-annual change in EFs for dairy cattle was observed for the Crimea Region (–5.1

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			per cent), while the highest inter-annual fluctuation was for the Magadan Region (+19.8 per cent). In the Moscow and Leningrad Regions, CH_4 EFs for dairy cattle increased by 17.74 and 18.29 per cent respectively between 2020 and 2021. In addition, significant changes were observed for non-dairy cattle for most regions. For example, the CH_4 EFs for non-dairy cattle for the Karachay-Cherkess Republic showed unusual growth of 41.28 per cent between 2014 and 2015 and a drop of 13.12 per cent between 2015 and 2016. In the Moscow and Leningrad Regions, such significant outliers were not noted for non-dairy cattle for 2005–2021 (annex 3.1, tables 1.3.8–1.3.9). The NIR does not provide an analysis of the key drivers of the significant inter-annual fluctuations in the EF trends for dairy and non-dairy cattle at the regional level. During the review, the Russian Federation explained that the inter-annual fluctuations in EFs for dairy cattle were caused by changes in milk productivity, while for non-dairy cattle, outliers were associated with changes in animal feeding rations, as well as changes in weight.
A.8	3.A.1 Cattle – CH_4 (A.8, 2020) (A.18, 2018) Accuracy	Correct the errors in the feed intake levels and CH_4 EFs and recalculate the emissions from enteric fermentation for non-dairy cattle in the Bryansk Region for all the relevant years. Thoroughly investigate the cause of the error to determine if there could be other regions of the Russian Federation affected by this mistake.	Resolved. The Party changed the methodology for calculating CH_4 emissions from cattle and has made relevant recalculations since the 2021 GHG inventory submission (see ID#s A.3–A.4 above). According to the revised data, the CH_4 EF for non-dairy cattle in the Bryansk Region decreased between 2014 and 2015 by 5.7 per cent. In addition, the following significant inter-annual changes were noted in this region: +8.53 per cent (2012–2013), +11.40 per cent (2013–2014), +16.51 per cent (2016–2017), +5.95 per cent (2019–2020) and –6.93 per cent (2020–2021). During the review, the Russian Federation clarified that for the Bryansk Region, observed fluctuations in CH_4 EFs for non-dairy cattle were caused by changes in the feeding rations, mainly under the largest industrial agroholding (Miratorg).
A.9	3.A.1 Cattle – CH_4 (A.13, 2020) Convention reporting adherence	Correct the reporting of Y_m values for category 3.A.1 (cattle) in CRF table 3.As1 and in the NIR for all years of the time series for the next annual submission.	Resolved. The Party provided the correct Y_m values used both for dairy and for non-dairy cattle (updated from 0.065 to 6.5 per cent) in its NIR (section 5.3.2, p.179) and CRF table 3.As1 for 1990–2021. These values are the upper limit of the default range (3–6.5 per cent) provided in the 2006 IPCC Guidelines (vol. 4, chap. 10.3.2, table 10.12, p.10.30).
A.10	3.B Manure management – CH_4 (A.11, 2020) (A.20, 2018) Transparency	Update the NIR so that the information about the EFs used for liquid manure (i.e. whether EFs for with or without natural crust cover are applied) is correct and consistent throughout the NIR.	Addressing. The Party has made progress in updating the information about the EFs used for liquid manure. The Party deleted in its 2023 NIR (section 5.4.2, para. 2, p.191) contradictory information from its 2020 NIR (section 5.4.2, para. 2, p.182), namely “the different MCF values: in accordance with the use of liquid storage systems with natural crust in the national calculations its value is 10 per cent, and in the default, calculation is used the MCF for liquid storage without natural crust (17 per cent)”.

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			The Party also described in the NIR (section 5.4.2, paras. 2–3, p.190) that according to a survey of agricultural enterprises, the liquid systems have been categorized as liquid systems without natural crust cover, and a default MCF of 17 per cent (2006 IPCC Guidelines, vol. 4, chap.10, table 10.17) was used for cattle and swine. However, the ERT noted a remaining inconsistency in the reporting in the NIR (section 5.4.2, para. 1, p.190), with the statement that "For swine are also used storage systems with liquid manure (with a natural crust)". During the review, the Party confirmed that liquid systems for swine and cattle manure have been classified as systems without natural crust cover and the contradictory text will be corrected in the next submission. The ERT considers that the recommendation has not yet been fully addressed because the Party has still inconsistently reported information about the categorization of liquid swine and cattle manure used to calculate CH_4 emissions from manure management in the NIR.
A.11	3.B.5 Indirect N_2O emissions – N_2O (A.15, 2020) Transparency	Include relevant information on the use of the notation key "NE" for indirect N_2O emissions from N leaching and run-off under category 3.B.5 (indirect N_2O emissions) in the NIR and CRF table 9.	Resolved. The Party included relevant information on the use of the notation key "NE" for indirect N_2O emissions from N leaching and run-off under category 3.B.5 (indirect N_2O emissions) in its NIR (section 5.2.2.2, p.198) and CRF table 9 for 1990–2021. The Party reported in its NIR (p.198) that emissions from N leaching and run-off were not estimated because the 2006 IPCC Guidelines do not explicitly provide default data for the fraction of managed manure N losses due to run-off and leaching (known as $Frac_{leachMS}$), as this fraction is highly uncertain and estimating N losses from leaching and run-off should be considered as part of the tier 2 method. The ERT considered that this clarification is in line with the IPCC 2006 Guidelines (vol. 4, chap. 10, p.10.26) where indirect N_2O emissions from leaching should be calculated if country-specific data on N leaching are available and used as a part of a tier 2 or tier 3 method.
LULUCF			
L.1	4. General (LULUCF) – CO_2 (L.1, 2020) (L.6, 2018) Transparency	Clarify in the NIR the method and references used for performing the uncertainty estimates for the LULUCF sector, in particular by specifying whether sampling error is included in the estimated 13 per cent uncertainty of the EF for deforestation (forest land converted to settlements) and by explaining how the uncertainty of the EF of biomass stock changes in forest land remaining forest land is derived from the reported uncertainty value of 20 per cent for standing volume.	Addressing. In the NIR (sections 6.4.1.1.3 and 6.4.5.2.1.3), the Party reported more detailed information and clarification on uncertainty values and relevant references for forest land remaining forest land and forest land converted to settlements. However, the ERT noted that information on whether the uncertainty value of the reported EFs accounts for the uncertainty in the assessment of changes in biomass stock of standing volume due to the sampling errors was not explained for the forest land remaining forest land category.

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			During the review, the Party provided additional clarification that the EF uncertainty values were based on data in peer-reviewed journals (references were provided). According to the national instructions for forest management inventory and planning adopted in 2018, the uncertainty of standing volume is based on accuracy of stock taxation. The NIR (p.290) reports that the accuracy of stock taxation for forest plantations used for economic activities is ±15 per cent, for other plantations is ±20 per cent, and for low-value and low-quality plantations is ±25 per cent. For uncertainty calculations, the average accuracy of the stock inventory in the areas was taken to be ±20 per cent. The Party also clarified that the uncertainty in NIR table 6.79 was calculated in accordance with the 2006 IPCC Guidelines (vol. 1, chap. 3, p.3.27). Based on the information provided, the ERT concluded that 13 per cent of sampling uncertainty is considered in the total uncertainty; however, the transparency of the information presented on the development of the EF uncertainty values can be further improved in the NIR.
L.2	4. General (LULUCF) – CO_2, CH_4 and N_2O (L.2, 2020) (L.9, 2018) Consistency	Collect AD on drainage of organic soils in forest land and on peat extraction areas for the years since 2008, and if this is not possible in time for the next annual submission and the current approach needs to be continued, include the impact of this extrapolation on the uncertainty of the inventory, include the collection of AD on drainage of organic soils in forest land and on peat extraction in the improvement plan and report on progress made in the NIR.	Addressing. The Party reported in CRF table 4.D updated information on peat extraction areas and corresponding emissions based on new data from the Ministry of Energy (letter ПС-17680/11, 29 November 2022) for the years since 2009. However, the ERT noted that the Party continued to report areas and related emissions from drained organic soils in forest land (CRF table 4.A) using extrapolation for 2008 onward. Furthermore, the ERT noted that the Party reported in its NIR (pp.289–290) uncertainty information on forest land remaining forest land without incorporating the uncertainty of the extrapolation approach or providing an explanation of the impact of such an approach. During the review, the Party clarified that the uncertainty of GHG emission estimates from drained forest land is 58 per cent for CO_2, 40 per cent for CH_4 and 80 per cent for N_2O, and that the uncertainty of emissions from drained organic areas in forest land was incorporated into its overall uncertainty estimates in forest land remaining forest land. The ERT considers that the recommendation has not yet been fully addressed because the Party has not yet collected AD on drainage of organic soils in forest land and has not yet included the impact of this extrapolation on the uncertainty of the inventory and the collection of AD on drainage of organic soils in forest land in the improvement plan or reported on progress made in the NIR.
L.3	General (LULUCF) (L.27, 2020)	Perform an analysis to determine which carbon pools and subcategories are significant in each key category in accordance with the 2006 IPCC Guidelines (vol. 1, chap.	Resolved. The Party reported in its NIR (section 6.6 and table 6.80) information on significant pools contributing to the key categories by more than 60 per cent, including biomass for forest land, organic soils for

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	Convention reporting adherence	4.2, p.4.8; and vol. 4, chap. 1.3, pp.1.12–1.13), and report in the NIR detailed information on the results of this analysis.	permanent cropland, grassland and pastures, and mineral soils for land converted to cropland, grassland and pastures. The reporting is in accordance with the 2006 IPCC Guidelines (vol. 1, chap. 4.2, p.4.8; and vol. 4, chap. 1.3, pp.1.12–1.13).
L.4	General (LULUCF) (L.28, 2020) Accuracy	Report estimates of carbon stock changes and associated emissions and removals for conversions from managed to unmanaged land for the entire time series, until the managed land under transition reaches the new equilibrium level of carbon stocks of the unmanaged land, after which the associated emissions and removals for unmanaged land do not have to be reported.	Not resolved. The Party continued to report in CRF table 4.1 areas of managed land converted to unmanaged land without reporting related emissions and removals in CRF tables 4.A–4.F. Specifically, the Party reported areas of managed forest land converted to unmanaged forest land, cropland converted to unmanaged grassland, settlements converted to unmanaged grassland, managed wetlands converted to unmanaged wetlands, and settlements converted to unmanaged wetlands but without reporting the related emissions or removals for the IPCC default transition period of 20 years or using a documented country-specific transition period. During the review, the Party clarified that the transfer to unmanaged lands occurs without anthropogenic influence. However, the ERT noted that the conversion of managed land to unmanaged land constitutes a change in land use or management and that land should be tracked for the default or country-specific transition period in accordance with the 2006 IPCC Guidelines (vol. 4, chap. 1.3.3, pp.1.12–1.13; vol. 4, chap. 2.3.1.1, p.2.13; and vol. 4, chap. 4.1, p.4.7). The Party noted that it will provide recalculations in its next submission.
L.5	General (LULUCF) (L.28, 2020) Accuracy	Use either the IPCC default 20-year transition period or, where appropriate, a country-specific transition period according to national circumstances, in the latter case providing supporting evidence in the NIR for its definition.	Not resolved. The Party reported in its NIR (section 6.3, p.247) a country-specific transition period of 50 years for land converted to forest land and land converted to grassland and one year for land converted to settlements (section 6.4.5.2.2.2, p.357), while reporting a 20-year default transition period for other land-use conversions. There is no background information in the NIR to support the selected country-specific transition period. The ERT also noted that the Party continued to report land conversions from managed land to unmanaged land (see ID# L.4 above) without applying either the IPCC default 20-year transition period or, where appropriate, a country-specific transition period in accordance with national circumstances to estimate related emissions and removals until land reaches the unmanaged equilibrium. During the review, the Party clarified that it will provide recalculations in its next submission.
L.6	Land representation – CO_2 (L.3, 2020) (L.8, 2018) Accuracy	List in the NIR all assumptions underlying the establishment of land-transition matrices and the land balance, including the transitions occurring prior to 1990, from 1940 or 1970 onward depending on the transition period chosen for each transition.	Resolved. The Party reported on its assumptions underlying the establishment of the land-transition matrices and the land balance in the NIR (sections 6.2–6.3). In particular, NIR table 6.2 presents the correspondence between the IPCC definitions and the land categories and land uses in the Russian Federation and section 6.3 provides further

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			details, for example a list of the assumptions used (p.244) and a note that the 20-year transition period was used (p.247) for conversion into all land categories except for land converted to forest land and grassland, which has a transition period of 50 years, and land converted to settlements, which has a transition period of one year. Furthermore, the Party provided summary data on land conversion from 1990 to 2021 in NIR table 6.4 and NIR table 6.5 presents net changes in land areas in the Russian Federation by land-use category. Data on land converted to forest land prior to 1990 are provided in NIR table 6.29, while NIR table 6.59 presents deforestation data since 1971.
L.7	Land representation – CO_2 (L.4, 2020) (L.8, 2018) Accuracy	Describe in the NIR how the original land use for the transition is determined when it is not directly identifiable in existing data sets (e.g. transitions to unmanaged forest land other than from managed forests) and clearly state in the NIR the adjustments made to guarantee a correct land balance.	Resolved. The Party reported land areas taken from official statistical data provided annually by the Federal Service for State Registration, Cadastre and Cartography, Rosstat and the Federal Agency for Forestry and the corresponding land-use changes and adjustments in the NIR (section 6.2). To guarantee a correct land balance, the Party reported the definition for other lands includes non-vegetated soils, rocky soils, ice and all unmanaged land areas that do not fall into any of the five other categories. The Party highlighted that such land representation allows the national land area to be balanced. Additional assumptions used to form the basis of the land-transition matrix are presented in the NIR (section 6.3, p.244).
L.8	Land representation – CO_2 (L.5, 2020) (L.8, 2018) Accuracy	If it is not possible to determine whether the original land use was cropland, grassland or other land, attribute land transitions to settlements to either cropland or grassland rather than other land.	Resolved. The Party revised the land conversion from other land to settlements for 2010 onward, as well as the transition from cropland and grassland. The NIR (p.390) notes that the recommendation was taken into account. However, the ERT noted that there are still conversions reported from other land reported by the Party. The Party also reported in CRF table 4.1 other land converted to settlements as "NO" for most years, except 2010 and 2014, for which it reported 34.76 kha and 2.56 kha respectively. During the review, the Party clarified that for most years, adjustments were made to the conversion of other land to settlements; however, the conversion from other land to settlements has been retained for two years to give an overall land balance. The Party indicated that adjustments are planned for the next submission; however, while highlighting that conversions from other land to settlements do occur, the Party noted that many of the properties that fall under the definition of other land can be converted to recreational facilities or buildings. The ERT agrees that conversion from other land to settlements is possible and considers the recommendation addressed.
L.9	Land representation (L.29, 2020) Comparability	Report detailed information in the NIR on how unmanaged forest land, grassland and wetlands are defined according to national land-use definitions,	Addressing. The Party reported in the NIR (section 6.2) information on the definitions of the different land-use categories, showing in NIR table 6.2 the correspondence between the national land-use definitions with the

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		including information on how unmanaged land is defined.	IPCC land-use definitions. The ERT observed that the Party reported detailed definitions of unmanaged wetlands and other unmanaged land under other lands but continued to report areas of unmanaged forest land and grassland without providing clear definitions for these categories in accordance with the 2006 IPCC Guidelines (vol. 4, chap. 3.2, p.3.6). During the review, the Party clarified that unmanaged forests include reserve forests and forests on other lands that do not meet the criteria of managed forests, as explained in the NIR (p.247), while unmanaged grassland includes hayfields and pastures, which are natural grasslands, and savannahs, where no anthropogenic activity takes place. Typically, unmanaged grassland is in areas remote from settlements. The Party indicated that these definitions will be included in the next NIR. The ERT considers that the recommendation has not yet been fully addressed because the Party has not yet provided clear definitions for unmanaged forests and grassland in the NIR.
L.10	Land representation (L.29, 2020) Transparency	Include detailed information in the NIR on the definition of the other land category, including tundra and disturbed lands with no significant soil carbon stocks and vegetation, and information on the geographical location of tundra in the country and its very limited human intervention.	Addressing. The Party reported in the NIR (section 6.2, table 6.2 and section 6.4.6) detailed information on the definition of the other land category, including non-vegetated soils, rocky soils, ice and all unmanaged land areas that do not fall into any of the five other categories, including tundra and disturbed lands. Furthermore, the Party also provided a map in the NIR (figure 6.5, p.249), which shows the geographical region of the tundra. However, the description does not mention the very limited human intervention in these areas. During the review, the Party explained that the tundra is not managed and that there is no economic activity carried out on these lands. The ERT considers that this recommendation has not yet been fully addressed because the information provided during the review on the human impact on tundra has not yet been reported in the NIR.
L.11	Land representation (L.29, 2020) Comparability	Include tundra areas under the grassland category, and further classify tundra areas as unmanaged grassland, if applicable.	Resolved. In the NIR (p.365), the Party explained that tundra has low productivity and that, because the soil carbon stocks in tundra reserves are not significant, it considers that they are not involved in carbon stock changes due to conversions and are therefore classified under unmanaged other land. Furthermore, during the review, the Party highlighted that according to national circumstances, tundra could only be classified as other land and not unmanaged grassland.
L.12	Land representation (L.30, 2020) Accuracy	Correct all the inconsistencies identified in the reporting of land representation for the next annual submission by ensuring that:	(a) Not resolved. In CRF table 4.1, for some years and land-use categories, the initial area reported in a given year (X) was not equal to the final area in the respective previous year (X–1) (e.g. for cropland there was a discrepancy between X and X–1 of 1,167.60 kha in 2009; for

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		(a) In CRF table 4.1, for all years and land-use categories, the initial area reported in a given year (X) is equal to the final area in the respective previous year (X–1); (b) In CRF table 4.1, the total country area reported is constant throughout the time series; (c) In the background CRF tables 4.A–4.F, for all years and land-use categories, the total areas reported in a given year match the total final areas of the respective categories reported in CRF table 4.1 for the same year; (d) The total country area obtained as the sum of the land-use categories each year from the background CRF tables 4.A–4.F is constant and equal to the total country area reported in CRF table 4.1; (e) The reported land-use conversion areas are verified from the annual land-use changes reported in CRF table 4.1, taking into account the transition period chosen by the Party.	grassland there were discrepancies for the whole time series, ranging from –1,564.06 kha in 2005 to +2,742.40 kha in 2008; for wetlands there were discrepancies for the whole time series, ranging from –131.82 ha in 2014 to +11.76 kha in 2015; and for other land there were discrepancies in 2009 of 3.95 kha, in 2014 of 253.43 kha and in 2015 of 3.03 kha). (b) Resolved. In CRF table 4.1, the total country area reported was not consistent throughout the time series (i.e. a total country area of 1,709,824.20 kha was reported for 1990–2013, but 1,712,519.10 kha was reported for 2014–2021). (c) Not resolved. In CRF tables 4.B–4.C, for cropland and grassland the total areas reported for 2009 do not match the respective total final areas reported in CRF table 4.1 for the same year. There is a discrepancy of 4,728.75 kha and 4,701.78 kha for cropland and grassland respectively. (d) Resolved. In CRF tables 4.A–4.F, the Party addressed the issue of ensuring that the total country area, obtained as the sum of the land-use categories each year, was equal to the total country area reported in CRF table 4.1. (e) Addressing. In CRF tables 4.A–4.F, the Party reported consistent land-use conversions for land converted to forest land, taking into account the 50-year transition period chosen by the Party and the annual land-use changes reported in CRF table 4.1. However, the Party continued to report inconsistent land-use conversions for land converted to wetlands, taking into consideration the 20-year transition period. In 2018, a discrepancy of 6,120.21 kha was observed between the value reported by the Party in CRF table 4.D and the value estimated by the ERT. During the review, the Party clarified that it made corrections to the calculations for CRF table 4.1 on the basis of the land-transition matrix; however, there were formula errors in the compilation of the table that resulted in the discrepancies. The Party noted that CRF tables 4.A–4.F have the correct acreage and emission/removal estimates. The Party further highlighted that all errors in the calculation files have been identified and will be corrected in the 2024 NIR. Work is under way to correct the land matrix calculation file and software development is planned to eliminate such errors in the future. The Party also explained that the changes in the total area of the country between 1990 and 2021 are due to the accession of the Republic of Crimea and Sevastopol to the Russian Federation. The ERT considers that the recommendation has not yet been fully addressed because the Party has not yet corrected some inconsistencies in its land representation between CRF table 4.1 and CRF tables 4.A–4.F.

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L.13	Land representation (L.30, 2020) Accuracy	Revise GHG emission and removal estimates as necessary to take into account corrections in the reporting of land representation, and report on the effects of the recalculations made in this regard in the respective sections of the NIR of the next annual submission.	Not resolved. The ERT noted that the Party made some improvements to its land representation (see ID# L.12 above); however, some inconsistencies remain. This recommendation will only be satisfied once ID# L.12 above has been resolved.
L.14	4.A.1 Forest land remaining forest land – CO_2 (L.7, 2020) (L.11, 2018) Transparency	(a) Describe in the NIR how data on age are collected, specifying in which cases a recorded clear-cut date and in which cases tree coring is used; (b) Describe in the NIR how data on standing volume are collected, including the reference for the allometric equations and the year of the last inventory when it comes from a ground inventory, and explain the satellite measurement methods, where relevant; (c) Include data in the NIR on the evolution of the distribution of areas per age group.	Resolved. The Party provided detailed information in the NIR (section 6.4.1.1.2, p.262) about its national forestry inventory, including: (a) That the age data of a tree stand are collected using historical information on clear-cutting and silvicultural activities from past forest management records. If needed, the age of a tree stand is clarified by examining three to five trees that represent the average age. Wood cores are extracted using an age drill to determine the age of the trees; (b) Standing volume data are collected through forest inventories conducted every 10–15 years. The collection process considers various factors, such as the origin of the forest stands (natural and artificial), tier structure, composition of tree species, average height and diameter of the trees, age of the tree stand, quality class, completeness, wood supply, marketability class, forest type or group of forest types, and presence of undergrowth and ground cover. To estimate the volume per hectare for each tier of forest plantation, the dominant tree species, average height of the tree stands and tier completeness are taken into account. This estimation is performed using forest taxation directories, specifically the references provided by Zagreev et al. (1992) and other relevant tables and models from 2008. Remote sensing techniques, specifically aerial photographs, are utilized to map land areas. The mapping process is based on a minimum mapping area of 0.1 ha, as specified in the instructions for forest management inventory and planning adopted in 2018; (c) The area age-class distribution is described in NIR figure 6.14 (p.264).
L.15	4.A.1 Forest land remaining forest land – CO_2 (L.9, 2020) (L.13, 2018) Transparency	Include in the NIR a description of how data on areas subject to fire and other disturbances are collected.	Resolved. The Party explained in the NIR (section 6.4.1.1.2) that it uses remote sensing (aerial photographs and satellite imagery) to annually update forest areas affected by logging, fires, and other natural and anthropogenic disturbances. During the review, the Party clarified that initial information about forest areas affected by logging, fires, and other natural and anthropogenic disturbances was collected annually through ground surveys and remote sensing by local forest management units and by a specialized organization of the Federal Agency for Forestry. Over the past 20 years, the Federal Agency for Forestry's Remote Monitoring Information System (https://pushkino.aviales.ru/main_pages/about.shtml)

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			has been developed and data on the area and volume of logging are based on ground data collected every year by local forest management units.
L.16	4.A.1 Forest land remaining forest land – CO_2 (L.10, 2020) (L.14, 2018) Transparency	Clarify and document in the NIR that the reason deadwood stock change with forest age in the calculations is neither flat nor U-shaped is because the deadwood resulting from slash from clear-cuts is excluded from deadwood stocks.	Not resolved. The Party reported country-specific methods for calculating the carbon stock in the deadwood pool (NIR equations 6.14–6.15, p.277) and country-specific coefficients (NIR table 6.19). However, the ERT noted that the Party continued to report on changes in the carbon stock in the deadwood pool without providing a detailed explanation in its NIR that the method assumes the instant oxidation of the total deadwood stock after clear-cutting and does not account for any post-disturbance emissions from decomposition. During the review, the Party reconfirmed that according to NIR equations 6.14–6.15 (p.277), it assumes instant oxidation of the total deadwood stock after clear-cutting. The ERT agrees with the explanation but considers that the recommendation has not yet been addressed because the Party has not yet included the relevant information on its assumption in its NIR.
L.17	4.A.1 Forest land remaining forest land – CO_2 (L.11, 2020) (L.15, 2018) Accuracy	Either provide in the NIR documentation supporting the assumption that soil carbon stocks increase with forest age, or use accurate EFs for soil carbon stock changes in forest land remaining forest land, possibly by reverting to a lower-tier method for this carbon pool, which, by assuming that soil carbon stocks are constant with age, would be more accurate than the assumption that soil carbon stocks in forests increase with forest age in the Russian Federation.	Addressing. The Party reported in the NIR (section 6.4.1.1.2, pp.286–287) a country-specific methodology to estimate soil carbon stocks that assumes a decrease in the stock of soil carbon after clear-cutting and destructive fires and an increase with the age of stands, reaching a stable state after 20 years. The Party cited soil studies (Jandl et al., 2007; Vedrova et al., 2009; Accumulation of carbon, 2018), however, these were not included in the reference list of the NIR. The previous ERT concluded that the presented references were not appropriate for the Russian Federation. During the review, the Party provided an additional publication based on the soil database of the Center of Forest Ecology and Productivity of the Russian Academy of Sciences (Zamolodchikov et al., 2021). The ERT noted that the additional publication focuses on estimating the carbon balance across all regions of the Russian Federation and does not contribute to enhancing the representativeness of the data that supports the assertion that soil carbon stocks increase with forest age. While noting that the Party used the best available national data, the ERT considers that this recommendation has not been yet fully addressed because the NIR does not contain a sufficient justification for the assumption used and information on soil carbon data in different types of forest and on the representativeness of the assumption used.
L.18	4.A.1 Forest land remaining forest land – CO_2 (L.12, 2020) (L.16, 2018) Accuracy	Use the data available on standing volume or other characteristics available at the local level for a few protected forests in order to verify that protected forests have similar characteristics to the average managed forest of the same region and ensure that no discrepancy	Not resolved. The Party did not report in the NIR information on activities undertaken to verify that protected forests have similar characteristics to the average managed forests in the same region in terms of average age, carbon stocks and carbon stock changes, and consequently did not ensure that no discrepancies in average age, carbon stocks and carbon stock

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		in average age and hence carbon stock and carbon stock changes assumed occur for the estimates for protected forests.	changes occur. The Party continued to assume that the same average net sequestration per unit area of managed forests per region applies to protected forests (NIR section 6.4.1.1.1.2, p.252). During the review, the Party clarified that information about forests on protected areas is already in the list of initial data in the new *Procedure for Preparing an Inventory of Anthropogenic Emissions from Sources and Removals by Sinks of Greenhouse Gases*, approved by an order of the Ministry of Natural Resources of the Russian Federation on 25 April 2022. The Party added that the Ministry of Natural Resources (protected areas are the responsibility of that ministry) had difficulties with collecting forest inventory data at the local level for protected areas (nature reserves, national parks, etc.) in 2022–2023 and that data will be collected by the Ministry of Natural Resources in 2024 or such data will be collected under the Unified National System for Monitoring Climate-Active Substances project. The ERT considers that the recommendation has not yet been addressed because the Party has not yet used the data on the standing volume or other characteristics available at the local level for a few protected forests in order to verify that protected forests have similar characteristics to the average managed forest of the same region.
L.19	4.A.1 Forest land remaining forest land – CO_2, N_2O and CH_4 (L.31, 2020) Accuracy	(a) Collect and use actual data on disturbances (burned and clear-cut) for estimating carbon stock losses in forest land remaining forest land, ensuring emissions are not overestimated or underestimated, and report the actual emissions in the year in which they occur; (b) In the meantime, report in the NIR information indicating that the temporarily unstocked forest land areas obtained each year are "net" areas, for which relevant data are collected separately for harvested and for burned areas by local Federal Agency for Forestry bodies, and that total living biomass was considered in estimating carbon stock losses, assuming complete oxidation as a result of the disturbance.	(a) Addressing. The Party reported in the NIR (section 6.4.1.1.2) methods for estimating carbon losses from the biomass pool in forest land remaining forest land indicating that the methods applied for estimating burned and clear-cut areas in forest land remaining forest land and the equations used (NIR equations 6.5–6.6, p.270) and the data provided by the State Forestry Survey do not contain information on the annual scale of disturbances; however, they include total assessments of disturbances as a result of logging, fires and other disturbances, which enables an estimation of the annual rate of disturbances. During the review, the Party clarified that according to information provided in the NIR (section 6.4.1.1.5, p.290), work on this recommendation is ongoing, and highlighted the significant progress made to date. (b) Not resolved. The Party did not report the recommended information in the NIR. The ERT noted that the data from the State Forestry Survey do not contain information on the annual scale of disturbances, but they do include total assessments of damage caused by logging, fires and other disturbances in areas of land temporarily not covered by forest (clearings, burned areas, destroyed plantings) (NIR p.270). However, the Party did not mention if temporarily unstocked forest land areas obtained each year are "net" areas, for which relevant data are collected separately for

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			harvested and for burned areas by local Federal Agency for Forestry bodies and if estimations of biomass loss support the assumption by the Party of complete oxidation because of the disturbance.
L.20	4.A.1 Forest land remaining forest land – CO_2 (L.32, 2020) Transparency	Provide in the NIR a detailed explanation of how carbon stock changes in all carbon pools are estimated for unmanaged forest land converted to managed forest land, in particular in the year of conversion, including information on the equation(s) used, the values of the parameters used in the equations before and after the conversion and their source(s), and how consistency in the treatment of land area used to estimate carbon stock changes is ensured in order to prevent erroneous inferences regarding increases in carbon stock changes due merely to increases in the managed forest land area.	Not resolved. The Party continued to report in CRF table 4.1 areas of unmanaged forest land converted to managed forest land (e.g. for 2009, 43,356.96 kha was converted from unmanaged forest to managed forest). Furthermore, in CRF table 4.A the Party estimated carbon stock changes from managed forest land including land converted from unmanaged forest land without providing details in its NIR (section 6.4.1.1.2, pp.262–289) on how these carbon stock changes are estimated for all carbon pools. During the review, the Party clarified that unmanaged forest land is not treated specially when it is converted to managed forest land and that regional governments receive additional financial support for unmanaged forest converted to managed forest for fire prevention and firefighting. Also, managed forests can be subject to forest harvesting if transport infrastructure exists. The carbon balance was calculated for all managed forests, including unmanaged forests converted to managed forests according to data provided by the Federal Agency for Forestry. The ERT considers that the recommendation has not yet been fully addressed because the Party has not yet included the information provided during the review in the NIR, particularly how carbon stock changes in all carbon pools are estimated for unmanaged forest land converted to managed forest land in the year of conversion.
L.21	4.A.1 Forest land remaining forest land – CO_2, N_2O and CH_4 (L.33, 2020) Completeness	Collect data and report carbon stock changes and associated emissions and removals from forest land used for defence and security for 1993 onward, ensuring time-series consistency, and include related relevant data and information in the NIR.	Resolved. The Party reported in NIR table 6.8 (p.253) and CRF table 4.A carbon stock changes and associated emissions and removals from forest land used for defence and security from 1993 onward, along with explanatory information. No inconsistencies in the time series were detected.
L.22	4.A.1 Forest land remaining forest land – CO_2, N_2O and CH_4 (L.34, 2020) Transparency	(a) Report shrubland areas as a separate stratum under the forest land category and the associated emissions from disturbances (fires and wood removal) in the relevant CRF tables; (b) Estimate carbon stock losses and associated emissions due to disturbances on the basis of the share of these land areas in each region and the area affected by disturbances in each region until better and more accurate data become available.	(a) Resolved. The Party reported the carbon balance of forest land with and without shrubs in annex 3.3 to the NIR (tables 3.3.5–3.3.6), including a separate approach for the estimation of carbon stock changes in forest land trees and forest land shrubs after conversion to settlements. Further, the Party reported shrubland converted to settlements in CRF table 4.E. During the review, the Party clarified that although it is possible to report carbon gains in shrubland, it is difficult to estimate carbon losses because data on disturbances are available at the administrative region level and not at the vegetation type level. Furthermore, the Party indicated that is not able to further disaggregate forest land in CRF table 4.A to include a separate stratum of shrubland. The ERT considers that based on national

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			circumstances, the recommendation has been met by reporting disaggregated information in the NIR and CRF table 4.E. (b) Resolved. The Party reported the carbon balance of forest land with and without shrubs in annex 3.3 to the NIR (tables 3.3.5–3.3.6). During the review, the Party clarified that carbon stock losses and associated emissions due to disturbances were calculated for each region separately according to the method described in NIR section 6.4.1.1.2. Carbon stock losses due to disturbances for each region were reported in annex 3.3 to the NIR (tables 3.3.3–3.3.4).
L.23	4.A.1 Forest land remaining forest land – N_2O (L.35, 2020) Completeness	Estimate direct and indirect N_2O emissions associated with the loss of soil organic matter in mineral soils from managed forests, protected areas and land for defence under forest land remaining forest land due to a change in management, in accordance with the 2006 IPCC Guidelines (vol. 4, chap. 2.3.3.1, p.2.29; and vol. 4, chap. 11, equations 11.1 and 11.10, pp.11.7 and 11.21 respectively), and report these emissions in CRF tables 4(III) and 4(IV) respectively.	Resolved. The Party continued to report carbon stock changes from mineral soils in forest land remaining forest land in CRF table 4.A without reporting the direct and indirect N_2O emissions associated with the loss of SOC in CRF tables 4(III) and 4(IV) respectively. During the review, the Party clarified that NIR equations 6.26–6.27 (p.287) are used for the accounting of SOC losses after disturbances. The Party further explained that SOC is partially decreased after disturbances and after forest regeneration, the SOC stock is restored over 20 years until a stable state is reached. Also, the Party noted there are no changes in SOC connected with land-use change or cultivation of forest soils and there is no practice for N additions and cultivation/land-use change on mineral soils after clear-cutting or other disturbances on forest land remaining forest land. The ERT noted that while the Party assumed partial CO_2 emissions from mineral soils following disturbances, this is not equivalent to a change in management or land use in which corresponding direct and indirect N_2O emissions should be reported in accordance with the 2006 IPCC Guidelines (vol. 4, chap. 2.3.3.1, p.2.29; and vol. 4, chap. 11, equations 11.1 and 11.10, pp.11.7 and 11.21 respectively) and should be reported in CRF tables 4(III) and 4(IV) respectively.
L.24	4.A.2.1 Cropland converted to forest land – CO_2 (L.14, 2020) (L.18, 2018) Accuracy	Use the EFs reported in NIR table 6.35 without the 33 per cent discount of SOC lost by fire in the calculation of soil carbon stock changes under cropland converted to forest land for all years of the time series.	Addressing. The Party reported in its NIR (section 6.4.1.2.5, p.301) that no recalculations were carried out in the cropland converted to forest land subcategory and that it plans to collect data on actual disturbances in protection and erosion control plantings. The ERT noted that from its 2020 submission the Party uses a discount rate of 1.4 per cent, citing Kulik and Pavlovsky (2008), instead of the 33 per cent rate used in the 2018 annual submission, based on an assumption that all emissions are as a result of fire. During the review, no further information was obtained from the Party to confirm the applicability of the discount. See ID# L.26 below.
L.25	4.A.2.1 Cropland converted to forest land – CO_2	Ensure the consistency of the ICSCFs reported for deadwood, litter and soil carbon in CRF table 4.A for	Resolved. The Party reported recalculated areas of cropland converted to forest land for the field protective and anti-erosion plantations

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	(L.15, 2020) (L.18, 2018) Accuracy	cropland converted to forest land and its subcategories, checking in particular that the ICSCFs for deadwood, litter and soil carbon under cropland converted to forest land equal the weighted average of the ICSCFs of each subcategory weighted by their respective areas.	subcategories in CRF table 4.A for the whole time series. This enabled the assessment of ICSCFs for deadwood, litter and soil carbon under cropland converted to forest land equal to the weighted average of the ICSCFs of each subcategory weighted by their respective areas.
L.26	4.A.2.1 Cropland converted to forest land – CO_2, N_2O and CH_4 (L.37, 2020) Accuracy	Collect and report actual data on the areas of cropland converted to forest land affected by disturbances, ensuring time-series consistency in the reported carbon stock changes by using, if necessary, the guidance provided in the 2006 IPCC Guidelines (vol. 1, chap. 5.3, pp.5.8–5.14).	Addressing. The Party reported in the NIR (section 6.4.1.2.5, p.301) that no recalculations were carried out in the cropland converted to forest land subcategory and that it plans to collect data on actual disturbances in protection and erosion control plantings (see ID# L.24 above). During the review, the Party clarified that it has plans to collect such data under the Unified National System for Monitoring Climate-Active Substances project in 2024.
L.27	4.A.2.1 Cropland converted to forest land – CO_2, N_2O and CH_4 (L.37, 2020) Transparency	Provide detailed information in the NIR on how carbon stock losses due to disturbances are estimated in all carbon pools for cropland converted to forest land.	Resolved. The Party reported in the NIR (section 6.4.1.2.1, p.293) the methodology for estimating carbon stock losses due to disturbances in all carbon pools in cropland converted to forest land. The Party reported that a coefficient of 0.014 was used for calculating carbon losses resulting from disturbances. This coefficient was applied to estimate losses across all carbon pools, and it was assumed that all carbon losses occur because of fires.
L.28	4.B.1 Cropland remaining cropland – CO_2 (L.38, 2020) Completeness	Either report clear evidence in the NIR that no management changes occurred in cropland remaining cropland during the years covered by the inventory time series and prior to 1990, taking into account the transition period applied by the Party in order for the carbon stock to reach the new equilibrium level, or estimate and report carbon stock changes in mineral soils in accordance with the 2006 IPCC Guidelines (vol. 4, chap. 5.2.3, p.5.15).	Not resolved. The Party continued to apply the tier 1 method from the 2006 IPCC Guidelines (vol. 4, chap. 5, p.5.22) to estimate CO_2 emissions from mineral soils in cropland remaining cropland, as reported in the NIR (section 6.4.2.1, p.284), and therefore it reported no carbon stock changes in CRF table 4.B, using the notation key "NO" on the basis of the assumption that no management changes occurred in this land-use category. Furthermore, the Party did not provide a justification for this assumption in the NIR. During the review, the Party clarified that there have been changes in the area of cropland remaining cropland, although there have been no significant changes in management practices, which are still mainly Soviet-era management practices. As evidence for this, the Party provided a document published in 1984 on State standards for pre-sowing tillage, which is still in use in the country. The Party informed the ERT that it plans to explore the possibility of developing an alternative method for estimating changes in soil carbon stocks for this category of land. The ERT considers that the recommendation has not yet been fully addressed because the Party provided information on only one subcategory of cropland (annual cropland and pre-sowing tillage). Considering the Party's national circumstances, the recommendation could be addressed by classifying disaggregated land areas as a

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			subcategory (e.g. annual cropland management, perennial cropland management) in CRF table 4.B and calculating the carbon changes in the event of a conversion of one subcategory to another subcategory.
L.29	4.B.2 Land converted to cropland – CO_2 (L.17, 2020) (L.20, 2018) Completeness	Report area changes in land converted to cropland whenever they occur, and in particular when the total area of cropland increases, and estimate and report the associated emissions or removals.	Resolved. The Party reported in CRF table 4.B areas of grassland converted to cropland in the years when conversions happened and the related emissions and removals. The Party also reported in the NIR (section 6.4.2.2) areas of land converted to arable and other agricultural land, detailed information on the methodology used for the assessment of land converted to cropland and the associated emissions (NIR table 6.39).
L.30	4.C.1 Grassland remaining grassland – CO_2 (L.38, 2020) Completeness	Either report clear evidence in the NIR that no management changes occurred in grassland remaining grassland during the years covered by the inventory time series and prior to 1990, taking into account the transition period applied by the Party in order for the carbon stock to reach the new equilibrium level, or estimate and report carbon stock changes in mineral soils in accordance with the 2006 IPCC Guidelines (vol. 4, chap. 6.2.3, p.6.14).	Addressing. The Party continued to apply the tier 1 method from the 2006 IPCC Guidelines (vol. 4, chap. 6, p.6.14) to estimate CO_2 emissions from mineral soils for grassland remaining grassland in the NIR (section 6.4.3.1, p.289) and therefore reported no carbon stock changes in CRF table 4.C, using the notation key "NO" on the basis of the assumption that no management changes occurred in the grassland remaining grassland land-use category. The Party did not provide a justification for this assumption in the NIR. In CRF table 4.C.1, "NO" is used for the grassland remaining grassland carbon stock in mineral soils. No evidence for or clarification of whether management changes occurred on cropland is provided in the NIR. During the review, the Party clarified that there have been changes in the area of cropland remaining cropland, although there have been no significant changes in management practices, which are still mainly Soviet-era management practices. The ERT considers that the recommendation has not yet been fully addressed because the Party has not provided evidence that management practices have not changed. Considering the Party's national circumstances, the recommendation could be addressed by classifying disaggregated land areas as a subcategory (e.g. degraded grassland management, improved grassland management) in CRF table 4.C and calculating the carbon changes in the event of a conversion of one subcategory to another.
L.31	4.C.2.2 Cropland converted to grassland – CO_2 (L.21, 2020) (L.22, 2018) Accuracy	Develop a country-specific value for dead organic matter carbon stocks in cropland to be used for estimating carbon stock changes in dead organic matter in cropland converted to grassland or, if this is not possible, use the default dead organic matter carbon stock value of zero for grassland when estimating carbon stock changes in dead organic matter in cropland converted to grassland.	Resolved. The Party recalculated the entire time series for cropland converted to grassland and reported in its NIR (section 6.4.3.2.1.2, p.315) a country-specific EF of 0.296 t C/ha for the dead organic matter pool when cropland is converted to grassland. According to the NIR, this EF was determined on the basis of the results of experimental studies conducted for different zones and averaged.

ID#	*Issue/problem classification*[a, b]	*Recommendation from previous review report*	*ERT assessment and rationale*
L.32	4.C.2.2 Cropland converted to grassland – CO_2 (L.39, 2020) Accuracy	Apply the average value of 2.9 t C/ha/year for estimating biomass carbon stock changes in cropland converted to grassland and revise the carbon stock changes reported in CRF table 4.C for all years of the inventory.	Resolved. The Party recalculated the entire time series applying the value of 2.9 t C/ha/year for average biomass carbon stock changes in cropland converted to grassland and the changes are reflected in CRF table 4.C.
L.33	4.C.2.2 Cropland converted to grassland – CO_2 (L.40, 2020) Accuracy	Revise the reporting of carbon stocks in CRF table 4.C and report carbon stock changes in living biomass in cropland converted to grassland due to abrupt changes in biomass associated with the land-use change only in the years during which cropland conversions to grassland occur.	Resolved. The Party reported in CRF table 4.C carbon stock changes in living biomass in cropland converted to grassland due to abrupt changes in biomass associated with land-use change in the years during which cropland conversions to grassland occurred, and some revisions of the values compared with the 2020 submission were introduced.
L.34	4.C.2.3 Wetlands converted to grassland – CO_2 (L.23, 2020) (L.24, 2018) Completeness	Estimate and report emissions and removals from carbon stock changes for the reported area of organic soils under wetlands converted to grassland.	Addressing. The Party reported in CRF table 4.C 1.85 kha of organic soils under wetlands converted to grassland for the whole time series but continued to report the related emissions and removals using notation key "NO" in CRF table 4.C. In its NIR (p.325) the Party reported that it is assumed that there were no changes in soil carbon stocks as a result of water run-off for soils of flooded lands converted to unmanaged grassland considering that the 2006 IPCC Guidelines do not provide default data for soils of flooded lands. However, the ERT also noted that the Party included the issue in its plan of improvement (NIR table 6.81, p.392). During the review, the Party clarified that the Russian Federation is working to improve the system of monitoring and calculating anthropogenic GHG emissions and removals within the framework of the Unified National System for Monitoring Climate-Active Substances project. National coefficients for the estimation of GHG emissions and removals during the conversion of wetlands to grassland are planned to be developed and the results are anticipated by 2030.
L.35	4.E.2.1 Forest land converted to settlements – CO_2, N_2O and CH_4 (L.41, 2020) Convention reporting adherence	Revise the combined uncertainty for forest land conversion to settlements for all gases, using the updated uncertainty values for the biomass, deadwood, litter and mineral soil pools, as necessary. Explain in the NIR the reasons for updating the uncertainty values for the different pools under forest land converted to settlements.	Resolved. The ERT noted when comparing the NIR with the 2020 submission that progress has been made by the Party in this area, as the uncertainty in the biomass pool has been corrected from the previous ±10 per cent to ±20 per cent, which is now consistent with other sections, taking into consideration the uncertainty of carbon losses in the biomass pool during forest conversion to settlements. According to the information provided in the NIR (p.355), this error correction did not have an impact on the combined uncertainty of the whole process of land transition, which is still ±48.7 per cent.
L.36	4.E.2.2 Cropland converted to settlements 4.F.2.2 Cropland converted to other land – CO_2 and	(a) Consistently apply a 20-year transition period for estimating carbon stock changes in mineral soils in cropland converted to settlements and cropland converted to other land across the time series, and report	Resolved. (a) The Party used a country-specific transition period of one year in its reporting in CRF tables 4.E (cropland converted to settlements) and 4.F (cropland converted to other land).

ID#	*Issue/problem classification*[a, b]	*Recommendation from previous review report*	*ERT assessment and rationale*
	N_2O (L.42, 2020) Completeness	associated emissions and removals in CRF tables 4.E and 4.F respectively; (b) Estimate and report direct and indirect N_2O emissions associated with losses of soil organic matter due to cropland converted to settlements and cropland converted to other land in CRF tables 4(III) and 4(IV) respectively; (c) If a transition period different from the IPCC 20-year default period is applied, provide clear evidence that the country-specific transition period is more appropriate to national circumstances.	(b) The Party reported in its NIR (pp.357 and 366) detailed information on N_2O emissions from cropland converted to settlements and other land and relevant estimates in CRF tables 4(III) and 4(IV) respectively. (c) The Party provided a justification for applying a one-year country-specific transition period for cropland converted to settlements (NIR section 6.4.5.2.2.2) and for conversion of cropland to other land (NIR section 6.4.6.2.1.2). In particular, for cropland converted to settlements, the biomass conversion period is assumed to be one year because during the first year of conversion, the final covering of the given territory is formed (e.g. "sealed soils"). Existing regulations for the construction and improvement of new urban and rural settlements indicate that changes in soil carbon stocks occur within one year. A similar justification is included for cropland converted to other land, for which the conversion of cropland to tundra is excluded.
L.37	4.E.2.2 Cropland converted to settlements – CO_2 (L.43, 2020) Accuracy	Apply the correct average carbon stock values for cropland and settlements when estimating the carbon stock change in biomass in cropland converted to settlements, and correct the carbon stock changes reported in CRF table 4.E for the entire inventory time series, ensuring that the average settlements biomass stock value is not double counted.	Not resolved. No recalculations were made for the category to reflect the recommendation. The Party reported in its NIR (section 6.4.5.2.2.2) that the cropland biomass stock value of 4.2 t C/ha and the average settlements biomass value of 0.8492 t C/ha were used for estimating biomass carbon stock changes in cropland converted to settlements. Although the difference between those two average values is –3.35 t C/ha/year, the Party continues to report, for example, an ICSCF of –2.50 t C/ha/year for 1991 in CRF table 4.E, which was the result of double counting the average settlements biomass stock value of 0.8492 t C/ha. During the 2020 review, it was explained by the Party that the mistake was human error when filling the CRF tables, but the mistake was not corrected in the 2023 submission. During the current review, the Party noted that the double accounting will be corrected in the next submission.
L.38	4.G HWP – CO_2 (L.25, 2020) (L.26, 2018) Convention reporting adherence	Report AD on production, imports and exports of sawnwood, wood panels, and paper and paperboard from 1960 to 1989 in CRF table 4.Gs2 and report sawnwood as a subcategory of solid wood in CRF table 4.Gs1.	Resolved. The Party reported in CRF table 4.Gs2 production, import and exports of sawnwood, wood panels, and paper and paperboard from 1961 to 2021 and reported sawnwood as a subcategory of solid wood in CRF table 4.Gs1.
L.39	4.G HWP – CO_2 (L.26, 2020) (L.27, 2018) Accuracy	Improve the consistency between the information on harvest reported under category 4.A (forest land) and HWP production reported under category 4.G (HWP) by investigating why wood production represents only about 33 per cent of total harvest (in 1990) and confirming the AD used in the CO_2 estimates for category 4.G (HWP), and if necessary, revise the estimates for this category.	Resolved. The Party continued to report different data on HWP quantities under category 4.A (forest land), as presented in NIR figure 6.8 (p.252), and on production quantities, as reported in CRF table 4.Gs2. However, the Party clarified in the NIR (section 6.4.7.1) that general deterioration of the economic situation in the Russian Federation in the early 1990s led to a crisis in the timber industry, thus the difference of 33 per cent in 1990 can be explained by the lack of demand for wood for the production of semi-finished products (most likely this wood remained at the wood harvesting sites). In addition, the HWP category does not include

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			fuelwood, which is included in the total harvest. A diagram of the production chain of wood products with the percentage of each category relative to the total volume of harvesting in the Russian Federation is provided in NIR figure 6.20 (p.381).
L.40	4.G HWP – CO_2 (L.44, 2020) Transparency	Report the correct half-life value of 35 years for sawnwood in CRF table 4.Gs1 for the whole inventory time series, report in the NIR the source of the half-life values used for the HWP categories, and report the factors used to convert product units to carbon for both solid wood and paper and paperboard in CRF table 4.Gs2.	Addressing. The Party corrected in CRF table 4.Gs1 the half-life value for sawnwood to 35 years for the whole inventory time series, as per the *2013 Revised Supplementary Methods and Good Practice Guidance Arising from the Kyoto Protocol* (chap. 2.8.3.2, table 2.8.2, p.2.123). However, the value is not referenced and reflected in the NIR. Furthermore, the Party did not report the factors used to convert product units to carbon for both solid wood and paper and paperboard in CRF table 4.Gs2, which are still reported as "NA". During the review, the Party informed the ERT that CRF table 4.Gs2 will be corrected in the 2024 submission.
L.41	4(III) Direct N_2O emissions from N mineralization/ immobilization – N_2O (L.46, 2020) Comparability	Report in CRF table 4(III) the cumulative area of land converted to settlements associated with the loss of SOC matter from mineral soils for all years of the inventory time series, in accordance with footnote (3) to CRF table 4(III).	Not resolved. The Party continued to report in CRF table 4(III) land area annually converted to settlements associated with the loss of SOC matter from mineral soils for all years of the inventory time series. In accordance with footnote 3 to CRF table 4(III) for converted lands, the cumulative area remaining in the category in the reporting year should be reported in this table. Taking into consideration that grassland is the key land category in CRF table 4(III) reported as converted to different types of land categories in the reporting period and that there were no changes in the management system of permanent grassland, as reported in the NIR (p. 309), the ERT notes that the mistake in reporting does not affect the estimated emissions for the category. During the review, the Party informed the ERT that the mistake will be corrected for all years in the next submission.
Waste			
W.1	5. General (waste) – CO_2, CH_4 and N_2O (W.2, 2020) (W.10, 2018) Transparency	Document and provide in the NIR documentation and references to the specific category in the energy sector where emissions from energy recovery for categories 5.C.1 (waste incineration) and 5.D.1 (domestic wastewater) are included and reported.	Resolved. The Party supplemented the clarification on the allocation of the emissions for category 5.C.1 (waste incineration) to subcategory 1.A.4.a.i (commercial/institutional – stationary combustion) provided in the previous submission and included in the NIR (p.425) information on the allocation of emissions from burning of biogas from sludge digesters under category 5.D.1 (waste incineration) to category 1.A.5.a (other stationary – biomass).
W.2	5.A Solid waste disposal on land – CH_4 (W.3, 2020) (W.11, 2018) Transparency	(a) Increase the transparency of the NIR by documenting the assumptions and expert judgment applied in the determination of the DOC(x) and provide relevant explanations on the decline in the trend of DOC(x),	(a) Resolved. In its NIR (pp.403–404), the Party included the assumptions and expert judgment applied in the determination of DOC(x). According to the Party, DOC in MSW for 1980–2012 was assessed on the basis of the long-term results of a study of the average composition of MSW in different climatic zones of the Soviet Union and the Russian Federation

ID#	Issue/problem classification[a, b]	Recommendation from previous review report	ERT assessment and rationale
		taking into account changes in composition of MSW landfilled over time; (b) Explain in the NIR how time-series consistency of the DOC(x) values was ensured and how splicing techniques were applied for filling the gaps in the time series.	(Mirny et al., 2010). The weighted average content of DOC(x) in MSW was calculated taking into account the available data on the fractional composition of MSW and national data on the carbon content in these fractions, as well as IPCC default values. The final values were obtained by averaging the data on the fractional composition of MSW in different climatic zones in different years. NIR table 7.3 (p.404) presents the evolution of DOC(x) from 1980 (15.5) to 2012 (17.9). The Party also explained that the trend of DOC depends on the shares of the waste containing decomposable carbon in MSW, as shown in NIR table 7.9. For the most recent years for which data are available, DOC content has increased owing to an increase in the share of paper in the MSW, despite a fall in food waste content. However, as a result of the increase in plastics wastes, including as a replacement for packaging paper, in years after 2011, this trend may have changed and cannot be used for extrapolation until more recent data are available. The Party noted in the planned improvements section of the NIR (7.2.6, p.413) that data will be collected to obtain information on the morphological composition of MSW. (b) Addressing. The Party reported in the NIR (p.403) that for the period before 1980, a constant DOC value of 15.5 was used, and for the period after 2012, a constant value of 17.9 was used. Data for the intervening years were obtained by linear interpolation from these values. The Party provided some information on the impact of changes in paper, plastic and food waste, but did not elaborate on the trend in DOC(x) over the entire time series in the NIR or during the review. The Party clarified that time-series consistency of DOC(x) values was ensured by using the results of studies of the composition of MSW of the Soviet Union and the Russian Federation provided by a research organization (Academy of Public Utilities KD Pamfilova) as listed in the bibliography of the NIR. However, the ERT noted that it is not clear from the explanation provided in the NIR and during the review exactly how time-series consistency was ensured and how interpolation was applied for filling the data gaps (i.e. missing years). For example, there is no clarity as to for which years of the time series data were interpolated and for which years real data were used. In addition, there is no clarification as to why DOC(x) is considered constant after 2012. During the review, the Party clarified that the impact of the waste management reform that began in 2019 was still considered too insignificant to impact the estimates.
W.3	5.A Solid waste disposal – CH_4	Correctly calculate the weighted average amount of DOC for 2008 and 2012, including the contribution of DOC in the MSW component “other”, and subsequently	Resolved. The Party revised the weighted average amount of DOC for 2008 and 2012 by including the contribution of DOC in the MSW component “other”. The results are provided in NIR table 7.3 (p.404). The

ID#	Issue/problem classification[a, b]	Recommendation from previous review report	ERT assessment and rationale
	(W.11, 2020) Accuracy	recalculate CH_4 emissions from SWDS under category 5.A (solid waste disposal).	CH_4 emissions from SWDS under category 5.A (solid waste disposal) were recalculated using the corrected data.
W.4	5.A Solid waste disposal – CH_4 (W.12, 2020) Accuracy	Improve the assessment of the climate zones where most of the Russian Federation's waste is generated and disposed of in order to determine a weighted average value for k, taking into account the relative amount of waste disposed of in different climate zones, and use this value in the estimates for this category.	Resolved. The Party reported in its NIR (p.405) the results of the study on the characterization of the climate zones in the Russian Federation in which most waste disposal takes place, which serve as the basis for the determination of the k value used (0.05 and 0.09 for dry and humid regions respectively) for MSW considering the climatic heterogeneity of the territory of the Russian Federation and the different values for dry and humid regions given in the 2006 IPCC Guidelines (vol. 5, chap. 3.2.1.1, table 3.3, p.3.17). The NIR (p.405) explains that the calculation considers only the values of k for the boreal and temperate climatic zones, since, in accordance with the *Good Practice Guidance for Land Use, Land-Use Change and Forestry* (chap. 3) and the Russian standard on construction climatology (Ministry of Regional Development of Russia, 2012a), they cover the entire territory of the Russian Federation. Data for potential evapotranspiration were taken from UNEP (2006). The annual amount of precipitation, taking into account a precipitation gauge correction (corresponding to the mean annual precipitation), was determined on the basis of data in the multi-year average monthly precipitation map of Afonin et al. (2008). The obtained data were correlated with the Russian Federation's administrative regions, for which it was possible to obtain the necessary statistical information on the amount of waste disposed and the population. The results on the territorial zoning of the Russian Federation according to the conditions of humidity and the corresponding values of k are shown in NIR table 7.5 (pp.405–406).
W.5	5.A.2 Unmanaged waste disposal sites – CH_4 (W.4, 2020) (W.12, 2018) Transparency	Transparently explain in the NIR the assumptions used to inform the classification of unmanaged SWDS and open shallow dumps where waste that is not centrally collected is generally deposited and also explain the related AD used in calculations.	Resolved. In the current submission the Party excluded from its inventory the emission estimates for unmanaged SWDS and "NO" is reported for this subcategory in CRF table 5.A. In the recalculations section of the 2022 NIR (7.2.5, p.405), the Party reported that CH_4 emissions were re-estimated owing to a recalculation of the amount of landfilled solid waste, which was, in turn, due to changes in the Party's approach and the exclusion of waste generated in rural areas and collected non-centrally. For an issue related to the revised SWDS classification, see ID# W.12 in table 5.
W.6	5.A.2 Unmanaged waste disposal sites – CH_4 (W.13, 2020) Accuracy	(a) Revise the data on waste disposed of at non-centralized SWDS, taking into account that waste assumed to be disposed of in rural areas without a waste collection system in general should not be accounted for in the inventory unless it can justify clearly in the NIR that this waste is actually disposed of at unmanaged	(a–c) Resolved. In the 2023 submission, AD and emissions from unmanaged SWDS are reported as "NO" for the entire time series in CRF table 5.A (see also ID# W.5 above and ID# W.12 in table 5). During the review, the Party informed the ERT that the MSW collection system has been reorganized and its population coverage is now almost 100 per cent, including in rural areas, which will be taken into account when developing

ID#	*Issue/problem classification*[a, b]	*Recommendation from previous review report*	*ERT assessment and rationale*
		SWDS on the basis of improved information and data on waste collection in rural areas; (b) Include in the NIR a summary of the information contained in the documents referred to by the Party (All-Russian Popular Front, 2018; Rosprirodnadzor, 2018) and the expert judgment applied to support its assumptions related to rural waste disposed of at non-centralized SWDS; (c) Use the revised and improved data to revise and report CH_4 emission estimates for category 5.A.2 (unmanaged waste disposal sites), as appropriate, for the next annual submission.	the next NIR. However, the ERT noted that the 100 per cent is not applicable for the entire time series but only for the recent years and the estimates should thus be re-evaluated to ensure accuracy of the emissions for the reported years. For an issue related to the revised SWDS classification and the documentation of the new approach, see ID# W.12 in table 5.
W.7	5.D.1 Domestic wastewater – CH_4 (W.8, 2020) (W.8, 2018) (W.8, 2017) Transparency	Use the notation key "NO" for the reporting of CH_4 flaring in CRF table 5.D and provide an explanation in the NIR that combustion of CH_4 in flares does not occur, and include a more detailed description in the NIR on how the amount of CH_4 combusted for energy recovery is calculated.	Addressing. The Party reported CH_4 flared using the notation key "NO" in CRF table 5.D and provided in its NIR (p.425) a description of how the amount of CH_4 combusted for energy recovery was calculated. However, the Party did not provide additional information in the NIR that would justify the assertion that combustion of CH_4 in flares does not occur. During the review, the Party clarified that the combustion of biogas without the utilization of electricity and heat occurs only in emergencies, which are very rare, so emissions are considered non-existent. The ERT agrees with this explanation and considers that the issue will be resolved once it is included in the NIR.
W.8	5.D.1 Domestic wastewater – CH_4 and N_2O (W.10, 2020) (W.15, 2018) Transparency	Enhance the transparency of the NIR by providing further details of the characterization of the various wastewater treatment systems and discharge pathways in the country in accordance with figure 6.1 of the 2006 IPCC Guidelines (vol. 5, chap. 6, p.6.7) and provide information on how the use of these systems has evolved over time, in particular by providing a justification for the declining trend in the population using the fourth type of treatment system presented in NIR table 7.12.	Resolved. The Party provided in NIR table 7.13 (p.424) details of the characterization of the various wastewater treatment systems and discharge pathways in the country in accordance with figure 6.1 of the 2006 IPCC Guidelines (vol. 5, chap. 6, p.6.7). The Party also provided a justification for the declining trend in the population using the fourth type of treatment system (population not connected to centralized wastewater treatment), which is presented in NIR table 7.13.
W.9	5.D.1 Domestic wastewater – CH_4 (W.14, 2020) Transparency	Describe in the NIR the methodology and assumptions used to estimate CH_4 emissions from aerobic wastewater treatment plants with anaerobic digestion of sludge, indicating explicitly that it corresponds to the most conservative case estimate.	Resolved. The Party explained in a note to NIR table 7.14 (p.425) that the overall MCF used, 0.8, corresponds to the most conservative case, assuming that no TOW is aerobically removed from the wastewater and all TOW ends up in sludge. The ERT concluded that the approach is in accordance with the IPCC Guidelines (vol. 5, chap. 6, table 6.3, p.6.13) and agrees with the assumptions used by the Party.

[a] References in parentheses are to the paragraph(s) and the year(s) of the previous review report(s) in which the issue or problem was raised. Issues are identified in accordance with paras. 80–83 of the UNFCCC review guidelines and classified as per para. 81 of the same guidelines. Problems are identified and classified as problems of transparency, accuracy, consistency, completeness or comparability in accordance with para. 69 of the Article 8 review guidelines in conjunction with decision 4/CMP.11.

[b] The reports on the reviews of the 2019, 2021 and 2022 annual submissions of the Russian Federation were not available at the time of this review. Therefore, the recommendations reflected in this table are taken from the 2020 annual review report. For the same reason, 2019, 2021 and 2022 are excluded from the list of review years in which issues could have been identified.

IV. Issues and problems identified in three or more successive reviews and not addressed by the Party

8. In accordance with paragraph 83 of the UNFCCC review guidelines, the ERT noted that the issues and/or problems included in table 4 have been identified in three or more successive reviews, including the review of the 2023 annual submission of the Russian Federation, and had not been addressed by the Party by the time of publication of this review report.

Table 4
Issues and/or problems identified in three or more successive reviews and not addressed by the Russian Federation

ID#	*Previous recommendation for issue*	*Number of successive reviews issue not addressed*[a]
General		
G.1	Improve the QA/QC process undertaken for the NIR and report on the improvements made in the NIR.	4 (2017–2023)
G.4	Improve the reporting of indirect CO_2 and N_2O emissions in CRF table 6 by using the appropriate notation keys and providing relevant information in the NIR.	3 (2018–2023)
Energy		
E.1	Review the use of notation keys for all categories in the energy sector and ensure the appropriate selection of notation keys for the complete time series.	8 (2012–2023)
E.4	Develop a country-specific value for the carbon content for liquid fuels, or, in accordance with paragraph 11 of the UNFCCC Annex I inventory reporting guidelines, until this can be achieved, provide a justification in the NIR explaining the reasons why this was not possible.	3 (2018–2023)
E.7	Provide in the NIR clear explanations on the inter-annual changes of the CO_2 IEFs for solid fuels between 2004 and 2005 and between 2015 and 2016 for subcategory 1.A.1.c.i (manufacture of solid fuels).	3 (2018–2023)
E.12	(a) Use the developed and verified national EFs for subcategory 1.B.2.a (oil) for the parts of the time series for which they are applicable, provided that it is demonstrated that they were developed in a manner consistent with the 2006 IPCC Guidelines and in accordance with paragraph 12 of the UNFCCC Annex I inventory reporting guidelines (e.g. by documenting in detail in the NIR how these EFs were developed and the results of the verification procedures performed); or, if this cannot be done in time for the next annual submission, include a description of the development of country-specific EFs for oil systems and explain why they cannot be used for that submission.	3 (2018–2023)

ID#	*Previous recommendation for issue*	*Number of successive reviews issue not addressed*[a]
E.14	(b) Add a new column in NIR table 3.35 to show clearly the source of each EF used for estimates of emissions for the subcategories under 1.B.2.b (natural gas).	3 (2018–2023)
E.16	Provide a clear justification and/or verification information in the NIR on the applicability of the country-specific CH_4 and CO_2 EFs for fugitive emissions from gas transmission, including information on the period of the time series for which they apply, in order to justify that they were developed in a manner consistent with the 2006 IPCC Guidelines and are considered to be more accurate than the IPCC defaults, in accordance with paragraph 12 of the UNFCCC Annex I inventory reporting guidelines.	3 (2018–2023)
E.17	(a) Provide a clear justification and/or verification information in the NIR on the applicability of the country-specific CH_4 and CO_2 EFs for fugitive emissions from gas production and processing activities, as well as for flaring emissions in these activities, in order to justify that the EFs were developed in a manner consistent with the 2006 IPCC Guidelines, in accordance with paragraph 12 of the UNFCCC Annex I inventory reporting guidelines; (b) In particular, clarify, justify and report in the NIR on the significant differences of the country-specific EFs used in the estimates of emissions from gas production and processing compared with the default EFs from table 4.2.4 and/or 4.2.5 of the 2006 IPCC Guidelines (vol. 2), and in general clarify and justify that the country-specific CH_4 and CO_2 EFs used in the estimates of emissions from gas production and processing are considered to be more accurate than the default values from the 2006 IPCC Guidelines.	3 (2018–2023)
E.18	Include explicit descriptions in the NIR and CRF table 9 that explain under which categories are reported the CO_2 and CH_4 emissions for subcategories 1.B.2.b.3 (natural gas – processing) and 1.B.2.c.ii (venting gas), for which the notation key "IE" is used.	3 (2018–2023)
IPPU		
I.5	Provide in the NIR a better explanation of which categories' CO_2 emissions from significant uses of urea are reported, including the provision of data on export/import of urea (e.g. as a trade balance).	4 (2017–2023)
I.9	Investigate and, as appropriate, resolve the discrepancy in reporting the CO_2 emissions from the NEU of fuels excluded from the energy sector (indicated as reported under non-energy products from fuels and solvent use in CRF table 1.A(d)) and those actually reported in the inventory in the IPPU sector under category 2.D (non-energy products from fuels and solvent use in CRF table 2(I).A-Hs2); and explain the reporting of NEU for the category 2.D in the NIR.	5 (2015/2016–2023)
I.10	Report data in CRF table 1.A(d) in line with the UNFCCC Annex I inventory reporting guidelines, in particular regarding the NEU of fuels that may be partly or may not be emissive and also report the related data and information in the columns "CO_2 emissions from the NEU reported in the inventory" and "Reported under:…".	3 (2018–2023)
I.11	Improve the accuracy of the emission estimates of fluorinated gases (HFCs, PFCs, SF_6 and NF_3) for category 2.E (electronics industry) in accordance with the 2006 IPCC Guidelines, ensure completeness of the estimates by covering all relevant activities occurring in the Russian Federation under this category, including PFC emissions from heat transfer fluids, and report in the NIR about progress in collecting AD for the complete and reliable implementation of the methodologies of the 2006 IPCC Guidelines.	3 (2018–2023)
Agriculture		

ID#	*Previous recommendation for issue*	*Number of successive reviews issue not addressed*[a]
A.2	(a) Perform QC checks at the disaggregated level (i.e. regions) to ensure that the feed intake in kg of dry mass does not exceed 3 per cent of the body mass in ruminants; (b) To avoid false conclusions, evaluate the current food intake limits for dairy cattle (3 per cent) that are used for performing the QC checks to determine whether a higher percentage may be more appropriate (e.g. 4 per cent).	3 (2018–2023)
A.10	Update the NIR so that the information about the EFs used for liquid manure (i.e. whether EFs for with or without natural crust cover are applied) is correct and consistent throughout the NIR.	3 (2018–2023)
LULUCF		
L.1	Clarify in the NIR the method and references used for performing the uncertainty estimates for the LULUCF sector, in particular by specifying whether sampling error is included in the estimated 13 per cent uncertainty of the EF for deforestation (forest land converted to settlements) and by explaining how the uncertainty of the EF of biomass stock changes in forest land remaining forest land is derived from the reported uncertainty value of 20 per cent for standing volume.	3 (2018–2023)
L.2	Collect AD on drainage of organic soils in forest land and on peat extraction areas for the years since 2008, and if this is not possible in time for the next annual submission and the current approach needs to be continued, include the impact of this extrapolation on the uncertainty of the inventory, include the collection of AD on drainage of organic soils in forest land and on peat extraction in the improvement plan and report on progress made in the NIR.	3 (2018–2023)
L.16	Clarify and document in the NIR that the reason deadwood stock change with forest age in the calculations is neither flat nor U-shaped is because the deadwood resulting from slash from clear-cuts is excluded from deadwood stocks.	3 (2018–2023)
L.17	Either provide in the NIR documentation supporting the assumption that soil carbon stocks increase with forest age, or use accurate EFs for soil carbon stock changes in forest land remaining forest land, possibly by reverting to a lower-tier method for this carbon pool, which, by assuming that soil carbon stocks are constant with age, would be more accurate than the assumption that soil carbon stocks in forests increase with forest age in the Russian Federation.	3 (2018–2023)
L.18	Use the data available on standing volume or other characteristics available at the local level for a few protected forests in order to verify that protected forests have similar characteristics to the average managed forest of the same region and ensure that no discrepancy in average age and hence carbon stock and carbon stock changes assumed occur for the estimates for protected forests.	3 (2018–2023)
L.24	Use the EFs reported in NIR table 6.35 without the 33 per cent discount of SOC lost by fire in the calculation of soil carbon stock changes under cropland converted to forest land for all years of the time series.	3 (2018–2023)
L.34	Estimate and report emissions and removals from carbon stock changes for the reported area of organic soils under wetlands converted to grassland.	3 (2018–2023)
Waste		
W.2	(b) Explain in the NIR how time-series consistency of the DOC(x) values was ensured and how splicing techniques were applied for filling the gaps in the time series.	3 (2018–2023)

ID#	*Previous recommendation for issue*	*Number of successive reviews issue not addressed*[a]
W.7	Use the notation key "NO" for the reporting of CH_4 flaring in CRF table 5.D and provide an explanation in the NIR that combustion of CH_4 in flares does not occur, and include a more detailed description in the NIR on how the amount of CH_4 combusted for energy recovery is calculated.	4 (2017–2023)

[a] Reports on the reviews of the 2019, 2021 and 2022 annual submissions of the Russian Federation have not yet been published. Therefore, 2019, 2021 and 2022 were not included when counting the number of successive years for this table. In addition, as the reviews of the Party's 2015 and 2016 annual submissions were conducted together, they are not considered successive reviews and 2015/2016 is counted as one year.

V. Additional findings made during the individual review of the Party's 2023 inventory submission

9. Table 5 presents findings made by the ERT during the individual review of the 2023 inventory submission of the Russian Federation that are additional to those identified in table 3.

Table 5
Additional findings made during the individual review of the 2023 inventory submission of the Russian Federation

ID#	*Finding classification*	*Description of finding with recommendation or encouragement*	*Is finding an issue/problem?*[a]
General			
G.5	QA/QC and verification	The ERT identified issues related to the transparency of reporting, such as incorrect reporting of notation keys for the energy sector (see ID#s E.1 in table 3 and E.23–E.24 below) and no reported rationale where "NE" was used for the IPPU sector (see ID# I.17 in table 3). Furthermore, in some cases, no information was provided on the use of the notation key "IE", that is, the Party did not indicate – either in the sectoral CRF tables or in CRF table 9 – where the relevant emissions are included (see ID#s I.13 and A.3 in table 3). The ERT also identified editorial errors for the waste sector in NIR table 7.3 (p.404), namely, 2011 is used in the table heading instead of 2012, and for the energy sector (see ID# G.2 in table 3). Furthermore, the ERT noted errors in the CRF tables: for example, the CO_2 IEF (200 t CO_2-C/t urea) for category 3.H (urea application) under the agriculture sector reported in CRF table 3.G-I is 1,000 times higher than the IPCC default value of 0.20 t CO_2-C/t urea (vol. 4, chap. 11.4.2, p.11.34) (see ID#A.18 below). Additionally, the ERT noted some inconsistencies between the CRF tables and the NIR, such as (1) under the IPPU sector, emissions of SO_2 from sulfuric acid production are reported in CRF table 2(I).A-Hs1 but corresponding information is not presented in the NIR; and (2) the data on the allocation of manure per MMS for non-dairy cattle are inconsistent between CRF table 3.B.a(s)2 and NIR table 5.11 (p.196) (see ID# A.17 below). The ERT therefore concluded that there is a problem with the implementation of the QA/QC plan and procedures. During the review, Party acknowledged that technical errors had been made.	Yes. Convention reporting adherence

ID#	*Finding classification*	*Description of finding with recommendation or encouragement*	*Is finding an issue/problem?*[a]
		The ERT recommends that the Party strengthen its QC procedures to eliminate errors linked to the use of notation keys in the CRF tables, data entry errors in the CRF tables, and inconsistencies within and between the NIR and CRF tables.	
G.6	Recalculations	The ERT identified some issues related to the reporting of recalculations and their explanations in different sectors of the inventory, such as the agriculture sector (see ID# A.14 below). During the review, the Party provided information regarding the recalculations made, the impact of the recalculations on the trend in emissions, and explanations for and justifications of the changes. The ERT recommends that the Party enhance its reporting on recalculations by providing, for any recalculation made, an explanation for the reason for the recalculation, the changes made to the calculation methods, AD and EFs, and how the recalculations affect the previously reported estimates, in accordance with the UNFCCC Annex I inventory reporting guidelines, paragraphs 43–45 and 50.	Yes. Transparency
Energy			
E.19	Fuel combustion – reference approach – all fuels – CO_2	The ERT noted that in previous review reports (FCCC/ARR/2018/RUS, ID# E.8, and FCCC/ARR/2020/RUS, ID# E.24) the Russian Federation was encouraged to continue investigating and to report on the reasons for the gap between the emissions obtained from reference and sectoral approaches. The Party reported information on the reference and sectoral approaches in its NIR (p.29), indicating that the difference in reported CO_2 emissions between the two approaches is 73,322.60 Gg, or 5.09 per cent for 2021, and explaining the reasons for this difference (e.g. energy losses). However, the ERT noted that the difference varies significantly over the time series, reaching up to 7.5 per cent (in 2000), while for other years the emissions are closely aligned (e.g. 0.1 per cent for 2006 or 2007). The emissions calculated using the reference approach are higher than those calculated using the sectoral approach, which may imply an underestimation of the CO_2 emissions included in the national totals. During the review, the Party explained that a study is planned in 2024 for the inventory team, jointly with Rosstat, to clarify the structure of the fuel and energy balance and introduce statistical reporting data from enterprises into the inventory estimates. This work should, among other things, identify and clarify the reasons for the discrepancy between the reference and sectoral approaches. The ERT reiterates the encouragement from the previous review report for the Russian Federation to continue investigating the reasons for the difference in reported CO_2 emissions between the reference and sectoral approaches and to report the results in the NIR, in particular analysing the differences by fuel type (i.e. liquid fuels, solid fuels, gaseous fuels, other fossil fuels and peat) with the aim of reducing gaps between the two approaches as much as possible and ensuring that the sectoral approach estimates are as accurate as possible.	Not an issue/problem
E.20	1.A.1.a Public electricity and heat production – all fuels – CO_2, CH_4 and N_2O	The Party reported in CRF table 1.A.1 only subcategory 1.A.1.a.ii. (combined heat and power generation) under category 1.A.1.a (public electricity and heat production). During the review, the Party clarified that the national energy balance provides aggregated information on fuel consumption for electricity and heat production and that, in 2024, joint work is planned with the inventory team and Rosstat to assess the possibility of presenting data on electricity, heat and cogeneration separately.	Not an issue/problem

ID#	*Finding classification*	*Description of finding with recommendation or encouragement*	*Is finding an issue/problem?*[a]
		The ERT encourages the Party to report separately all three subcategories of category 1.A.1.a, namely 1.A.1.a.i (electricity generation), 1.A.1.a.ii (combined heat and power generation) and 1.A.1.a.iii (heat plants), in accordance with the 2006 IPCC Guidelines (vol. 2, chap. 2, table 2.1).	
E.21	1.A.1.c Manufacture of solid fuels and other energy industries – solid fuels – CO_2, CH_4 and N_2O	For 2021, the Party reported in CRF table 1.A(a)s1 a CO_2 IEF of 44.4 t/TJ, a CH_4 IEF of 1 kg/TJ and an N_2O IEF of 0.1 kg/TJ for solid fuels under subcategory 1.A.1.c.i (manufacture of solid fuels). The ERT noted that according to NIR table 3.12, the largest contribution to fuel consumption in this subcategory was hard coal (4,250.57 TJ), which has a much higher EF (94.6 t/TJ).	Yes. Convention reporting adherence
		During the review, the Party clarified that the only solid fuel in this category is coke oven gas, with a CO_2 EF of 44.4 t/TJ. The Party also stated that there are errors in NIR table 3.12; for example, the coke oven gas amount for subcategory 1.A.1.b (petroleum refining) (40,117.85 TJ) should replace subcategory 1.A.1.c.i (manufacture of solid fuels) and the hard coal amount (4,250.57 TJ) for subcategory 1.A.1.c.i (manufacture of solid fuels) should replace subcategory 1.A.1.c.ii (oil and gas extraction).	
		The ERT recommends that the Party strengthen its QC procedures and report the correct amounts of solid fuel in NIR table 3.12 (p.45) under category 1.A.1.c.i (e.g. the amounts of coke oven gas and hard coal), as well as ensure that the reporting of all fuels is consistent between NIR table 3.12 and CRF table 1.A(a)s1.	
E.22	1.A.3.b Road transportation – gaseous fuels – CO_2, CH_4 and N_2O	The Party used the notation key "NO" in CRF table 1.A(a)s3 for gaseous fuels under category 1.A.3.b (road transportation), which the ERT noted does not correspond to official statistical data from Rosstat (https://rosstat.gov.ru/storage/mediabank/nal_avto_gaz.xls) that include the number of registered vehicles using natural gas.	Yes. Completeness
		During the review, the Party clarified that detailed data on the energy balance cannot be disclosed owing to confidentiality reasons. The national energy balance provides information on fuel consumption by type of economic activity and fuel use is not divided into mobile and stationary end use. Currently it is assumed that only LPG is used in mobile combustion. However, in the future, the Party expects to be able to calculate more accurate estimates of the consumption of gaseous fuels using data from gas filling companies.	
		The ERT recommends that the Party either estimate emissions of natural gas consumed in road transport under category 1.A.3.b (road transportation) for the next submission or, if this cannot be done, clarify in the NIR how natural gas used in road transport is considered in the inventory (if it is not estimated or included elsewhere in the sector), report the appropriate notation key ("IE" or "NE") in CRF table 1.A(a)s3 and provide the corresponding explanation in CRF table 9.	
E.23	1.A.5.a Stationary – other fossil fuels – CO_2, CH_4 and N_2O	The Party reported AD as "NO" in CRF table 1.A(a)s4 for other fossil fuels under subcategory 1.A.5.a (stationary) for 1992–1999, 2001 and 2004–2008, while emissions of CO_2, CH_4 and N_2O were estimated for the entire time series.	Yes. Accuracy
		During the review, the Party clarified that there is a mistake in the CRF table and that the emissions should also be reported as "NO".	
		The ERT recommends that the Party report AD and emissions consistently in CRF table 1.A(a)s4 for 1992–1999, 2001 and 2004–2008 for other fossil fuels under this subcategory and clearly specify in the NIR which fuels were	

ID#	*Finding classification*	*Description of finding with recommendation or encouragement*	*Is finding an issue/problem?*[a]
		included as other fossil fuels and why these were not reported in the emission estimates for 1992–1999, 2001 and 2004–2008.	
E.24	1.A.5.b Mobile – liquid fuels – CO_2, CH_4 and N_2O	The Party reported emissions from liquid fuels under subcategory 1.A.5.a (stationary) but not subcategory 1.A.5.b (mobile) in CRF table 1.A(a)s4. The ERT noted that the NIR is not clear on the coverage of both subcategories or on the reasons for AD for liquid fuels being reported only for stationary sources while "NA" was reported for mobile sources. The ERT considers that a lack of mobile sources is unlikely and that the use of "NA" is not in line with paragraph 37 of the UNFCCC Annex I inventory reporting guidelines. During the review, the Party explained that the national energy statistical data are not disaggregated by stationary and mobile combustion for category 1.A.5 (other), resulting in combined reporting under category 1.A.5.a. The ERT, noting the difference in EFs for liquid fuels for stationary and mobile combustion, recommends that for the next submission the Party either disaggregate AD for liquid fuels and ensure that the emissions under subcategory 1.A.5.b (mobile) are included separately in the inventory using the appropriate EFs or, if this cannot be done, report in CRF table 1.A(a)s4 "IE" instead of "NA" for liquid fuels under subcategory 1.A.5.b and provide the relevant explanation in the NIR and in CRF table 9.	Yes. Accuracy
IPPU			
I.20	2.B.2 Nitric acid production – N_2O	The Party used an EF of 0.002 t/t (the lowest of the default values in the 2006 IPCC Guidelines (vol. 3, chap. 3, table 3.3, p.3.23)) to estimate N_2O emissions for all nitric acid production processes in the Russian Federation. The ERT noted that the Party used the lowest EF of all Parties for 1990–2003 and applied the same value across the entire time series (1990–2021). The Party reported in NIR tables 4.19–4.20 (pp.119–120) data on nitric acid consumption and production. The total consumption amounts to 9,968 kt (NIR table 4.19) in 2021, while nitric acid production was reported as 10,324 kt for the same year. The total quantity of nitric acid produced, as reported in CRF table2(I).A-Hs1 for 2017–2021, ranges from 9,147.91 to 10,324.07 kt, which is equivalent to the total used in fertilizer production plants in the Russian Federation (NIR table 4.19, p.119). The Russian Federation did not report the quantity of nitric acid exported, which amounts to 14,544 kt in 2019 according to a World Bank database (https://wits.worldbank.org/trade/comtrade/en/country/RUS/year/2019/tradeflow/Exports/partner/ALL/product/280800). The Party reported in its NIR (p.118) that there were difficulties in collecting data on nitric acid production amounts, because the production of weak nitric acid, which is used as an intermediary product in different industrial processes, is not considered in the Party's statistics. The Party described the methodology used to estimate the quantity of nitric acid necessary for the production of fertilizers. There is no explanation in the NIR, however, as to whether the weak nitric acid technological processes installed in different plants are comparable, whether the ageing of equipment is considered, and whether similar abatement technologies with similar efficiencies are used to justify the use of the lowest default EF across the time series. During the review, the Russian Federation informed the ERT that there is no information on nitric acid imports and exports. The Party explained that according to the data in the technical reference book on the best available technologies issued in 2019 (pp.169, 178, 188 and 196), all industrial installations are equipped with catalytic purification systems to reduce N emissions. Catalytic purification systems are installed at all plants to ensure that nitrogen oxide emissions are below 0.006 per cent by volume (technical reference book on the best available technologies, p.204). The Party mentioned that the technical reference book on the best available technologies is an	Yes. Transparency

ID#	*Finding classification*	*Description of finding with recommendation or encouragement*	*Is finding an issue/problem?*[a]
		official standardization document developed as a result of an analysis of the technological, technical and management practices used in the production of ammonia, mineral fertilizers and inorganic acids. The ERT recommends that the Party clearly justify the choice of the low EF for nitric acid production and use of the same value across the time series, describe the abatement technology installed in all nitric acid plants between 1990 and 2021, and clearly explain the AD used for the estimates. The ERT encourages the Party to provide information on nitric acid production nationwide (both for strong and weak nitric acid), the volume of nitric acid used for fertilizer production and nitric acid exports to Kazakhstan and other surrounding countries (and imports, if any) to apply the mass balance and calculate the quantity of total nitric acid produced in the Russian Federation in order to estimate N_2O emissions for this category in line with the 2006 IPCC Guidelines. Noting that nitric acid production is not a key category, the ERT encourages the Party to check the efficiency of the abatement technology installed from 1990 to 2021 in order to determine the most appropriate country- or plant-specific EFs to apply for each period at the national or plant level, as necessary.	
I.21	2.B.10 Other (chemical industry) – Hydrogen production – CO_2	The ERT commends the Party for implementing the recommendation of the previous ERT to estimate emissions from hydrogen production. The ERT noted that the tier 1a methodology was used for category 2.B.10 (other), which was identified as a key category (trend) according to the results of the key category analysis (NIR annex 1, table 1.3, p.7). The Party applied equation 3.46 from the 2019 Refinement to the 2006 IPCC Guidelines (vol. 3, chap.3, p.3.43). However, the ERT noted that the part of the equation related to CO_2 recovery during the different processes was not considered in the calculation and the Party reported "NO" for CO_2 recovery in table 2(I).A-H. In addition, the Russian Federation reported on all processes of hydrogen production occurring within the country in its NIR but did not report the oxidation technologies used, whether complete and/or partial oxidation technologies are installed in the country, and whether the Party plans to move to the use of a higher-tier methodology for estimating emissions from hydrogen production, given that it is a key category. During the review, the Party informed the ERT that there is no plan to move to a higher-tier methodology to estimate emissions from this source. The ERT recommends that the Party assess and report on the types of oxidation technologies used and the CO_2 recovery practices in the plants in which hydrogen is produced, for the entire time series. The ERT also recommends that the Party clarify whether CO_2 recovery is considered in the emission estimates for the category and update the notation key for recovery in CRF table 2(I).A-H, if necessary.	Yes. Transparency
I.22	2.G.2 SF_6 and PFCs from other product use – SF_6	The Party reported in its NIR (p.167) that interpolation and extrapolation were used on the available data to complete the time series for accelerator under subcategory 2.G.2 because official data that could be used as AD are available only for 2007–2015 and 2018–2021. Both interpolation and extrapolation were applied for 1990–2006, while for 2016–2017, only interpolation was applied. The ERT noted that the trend of the time series between 2015 and 2018 shows a lower value for 2017 (13.69 t SF_6) than the values reported for 2015, 2016 and 2018 (14.83, 14.74 and 14.42 t SF_6 respectively), although the Party stated that interpolation was used for 2017. The Party did not provide a description of the method of interpolation applied to determine emissions for 2017. During the review, the Party provided general information on the EFs used across the time series but did not explain the non-linear nature of the emission estimate for 2017.	Yes. Transparency

ID#	*Finding classification*	*Description of finding with recommendation or encouragement*	*Is finding an issue/problem?*[a]
		The ERT recommends that the Party explain the reason for the drop in SF_6 emissions in 2017 and clarify whether data for this year were interpolated or whether the emission estimate was based on newly acquired data. If data were interpolated, the ERT recommends that the Party describe the method of interpolation and the results of the gap-filling procedure for 2017.	
Agriculture			
A.12	3. General (agriculture) – CH_4 and N_2O	The Party did not subdivide cattle into subcategories according to age, type of production and sex, as suggested in the 2006 IPCC Guidelines (vol. 4, chap. 10, pp.10.10–10.11) to estimate GE using the tier 2 methodology (vol. 4, chap. 10, p.10.21). During the review, the Russian Federation explained that collecting data for different subcategories for supporting enhanced livestock characterization will be included in the improvement plan under the Unified National System for Monitoring Climate-Active Substances project. One of the aims of the project is to identify gaps in the statistical information required for estimating emissions and the Party plans to collect the missing information related to the structure of the livestock population in the agriculture sector up until 2030. The ERT encourages the Russian Federation to make an effort to subdivide cattle by subcategory and to collect the data needed to calculate GE on the basis of enhanced livestock characterization in accordance with its improvement plan and to report on the plans and progress in this regard in the next NIR.	Not an issue/problem
A.13	3. General (agriculture) – CH_4 and N_2O	The ERT noted that in the NIR (p.176) the average livestock population was reported as being calculated annually using correction factors based on monthly statistics available since 2006 for cattle, swine, sheep and goats. However, the ERT did not find information in the NIR on which correction factors were used and the basis for the assumptions used to estimate unavailable statistical data that were applied to calculate the average livestock population for 1990–2005 for cattle, swine, sheep and goats. During the review, the Russian Federation clarified that average correction factors based on data for 2006–2008 were used for 1990–2005. The ERT recommends that the Party provide in the NIR information on the approach used to determine the correction factors, including their value, and an explanation of how they are applied to calculate the average livestock population for 1990–2005 for cattle, swine, sheep and goats.	Yes. Transparency
A.14	3. General (agriculture) – CH_4	The ERT noted that the Party recalculated CH_4 emissions and EFs from enteric fermentation for cattle for 1990–2020 between the 2022 and 2023 submissions, which resulted in an increase in emissions for 1990 and 2020 of 3.59 and 6.09 per cent respectively and an increase in IEFs of 3.49 and 6.09 per cent respectively. In the NIR (p.188), the Party reported that the recalculations were necessitated by the application of the IPCC tier 2 method for estimating GE and EFs. However, the ERT noted that the IPCC tier 2 method was introduced for the 2021 inventory submission, which therefore does not explain the differences between the 2022 and 2023 submissions. In addition, the ERT noted that in the NIR (p.188) the livestock populations for swine, sheep and goats were updated for 2016–2020 and the nutria population was revised for 2020 in the 2023 inventory submission. However, the reasons for these revisions were not stated in the NIR. During the review, the Russian Federation clarified that the recalculations of CH_4 emissions and EFs from enteric fermentation for cattle were due to an adjustment of the values of cow milk fat content made as a result of testing	Yes. Transparency

ID#	*Finding classification*	*Description of finding with recommendation or encouragement*	*Is finding an issue/problem?*[a]
		the new IPCC calculation tool. The Party also explained that changes in the population data for 2016–2020 were due to Rosstat carrying out a revision of the historical dynamic series as a result of the All-Russian Agricultural Census in 2016. The population of nutria was revised for 2020 owing to the correction of a mistake. The ERT recommends that the Party include clear information on the reasons for the annual recalculations in the NIR, covering all performed recalculations for the sector, in accordance with paragraphs 43–45 and 50 of the UNFCCC Annex I inventory reporting guidelines.	
A.15	3.A.1 Cattle 3.B.1 Cattle 3.D Direct and indirect N_2O emissions from agricultural soils – CH_4 and N_2O	In the 2023 GHG inventory submission, the Russian Federation calculated GE for cattle using the tier 2 approach (2006 IPCC Guidelines, vol. 4, chap. 10, p.10.21) (see ID# A.3 in table 3). However, the NIR provides limited information on the parameters and assumptions used in the calculation of GE values for cattle. For most of the input parameters, the Party reported "NE" or "IE" in CRF table 3.As2, without providing explanatory information in the NIR or in the relevant CRF tables. For example, CRF table 3.As2 indicate the share of pregnant cows as "NE" and the feeding situation as "IE". Data on pregnancy and feeding were not included in the NIR. In addition, the ERT noted that the reference provided in the NIR (p.178) for the weight of cattle (a weblink to the Rosstat website) is incorrect and does not show the parameters and assumptions applied to estimate GE (e.g. the weight of mature animals and daily weight gains). The ERT also noted that the NIR does not include a description of the method used to collect data on weight for the years for which statistical data are not available. Moreover, the ERT noted that it was not clear in the NIR whether regional weight and weight gain data were available from the national statistics for each region and accordingly used in the GE calculations for cattle. During the review, the Russian Federation provided the calculation sheet for GE estimates for cattle, which includes all the steps, data and parameters involved. The Party also provided additional clarification on the parameters and assumptions applied and provided a weblink to the available data on weight from Rosstat applied for cattle for 2012–2021 (https://rosstat.gov.ru/compendium/document/13277). The Party clarified that where data were not available, average data were used. The Russian Federation confirmed the use of regional data for the productivity of cattle in the calculations. The ERT recommends that the Party provide clear information on all parameters and assumptions used in the calculation of GE, including the sources of and correct references to the data used in the calculations, and describe the method used to collect data on weight for the estimates of GE or the years for which statistical data are not available.	Yes. Transparency
A.16	3.B Manure management 3.D Direct and indirect N_2O emissions from agricultural soils – N_2O	The ERT noted unusual inter-annual changes in Nex rate for dairy cattle (in particular, between 2018 and 2019 it decreased by 7.2 per cent, between 2019 and 2020 it increased by 11.5 per cent and between 2020 and 2021 it increased by 13.8 per cent). Unusual inter-annual fluctuations in Nex rate for non-dairy cattle were also observed for 2001–2002, when the value decreased by 16.0 per cent, and between 2003 and 2004, when the value increased by 19.9 per cent. The ERT could not find explanations for the year-to-year variations in the trend of GE and Nex values for both dairy and non-dairy cattle in the NIR. During the review, the Russian Federation clarified that the observed fluctuations in the trend of Nex were caused by an error in the values for per cent crude protein in diet (input) and provided the correct values of Nex for cattle to the ERT. The correct values of Nex rate for dairy cattle are 110.79 kg N/head for 2019, 111.82 kg N/head for	Yes. Accuracy

ID#	Finding classification	Description of finding with recommendation or encouragement	Is finding an issue/problem?[a]
		2020 and 113.59 kg N/head for 2021. For non-dairy cattle, the correct values of Nex rate are 26.98 kg N/head for 2001, 27.31 kg N/head for 2002, 27.36 kg N/head for 2003 and 27.19 kg N/head for 2004. The ERT recommends that for the next submission, the Party (1) revise the Nex rate values for cattle and improve the accuracy of N_2O emissions from manure management and agricultural soils, in particular for 2019–2021 for dairy cattle and for 2001–2004 for non-dairy cattle and (2) provide the reasons for the inter-annual fluctuations in the Nex values, if still observed.	
A.17	3.B Manure management 3.D Direct and indirect N_2O emissions from agricultural soils – CH_4 and N_2O	The ERT noted that the data reported in CRF table 3.B(a)s2 indicate a rapid fall in the share of liquid MMS for non-dairy cattle between 2016 and 2017, from 13.88 to 8.11 per cent. The ERT also noted that the sum of the shares of MMS in CRF table 3.B.a(s)2 is not 100 per cent but 94.5 per cent in 2017 and 2018, and it found that around 5.5 per cent of excreted non-dairy cattle manure is not covered in CRF table 3.B.a(s)2. An unusual inter-annual change of 10.4 per cent in the CH_4 IEF for manure management for non-dairy cattle between 2004 and 2005, which decreased from 3.81 to 3.41 kg/head/year, was noted by the ERT. Another unusual change was observed between 2016 and 2017: the CH_4 IEF decreased from 3.56 to 2.87 kg/head/year (19.4 per cent). The NIR does not include the reasons for these drops in the IEFs for manure management across the time series. In addition, the ERT noted in CRF table 3.B(b) a 95.6 per cent fall in N excreted per solid MMS for non-dairy cattle between 1994 and 1995 and 94.1 per cent growth between 1995 and 1996, resulting in a decrease of total N excreted between 1994 and 1995 of 57.4 per cent and an increase between 1995 and 1996 of 77.3 per cent. Also, the ERT noted that data on the share of the allocation of different MMS for non-dairy cattle provided in CRF table 3.B(a)s2 are not consistent with data generated from CRF table 3.B(b) on the ratio of N excreted per MMS in kg/year to total N excreted in kg/year for 2007–2019. Furthermore, the ERT noted inconsistencies between CRF table 3.B(a)s2 and NIR table 5.11 (p.196) with regard to the allocation per MMS for non-dairy cattle, particularly for 2016–2019 (e.g. 60.76 versus 60.28 per cent for solid storage and dry lot for 2018). During the review, the Russian Federation confirmed that there was an error in the data on the allocation of manure per MMS in CRF table 3.B.a(s)2 for 2017 and 2018. Also, the Party confirmed that an unusual outlier of N excreted for non-dairy cattle was observed owing to an error made in 1995. The Russian Federation attributed the changes in the CH_4 IEF for manure management for non-dairy cattle to the rapid decrease in the population of non-dairy cattle and the reduction in the share of liquid MMS. However, the ERT considered that this explanation is not sufficient to explain the drop in the CH_4 IEF for 2016–2017 given the inconsistencies found in the data on manure management distribution. The Party did not clarify the above-mentioned inconsistences between the CRF tables and the NIR that were found for the shares of MMS in 2007–2019. The ERT recommends that for the next submission, the Russian Federation revise the data on the share of manure distributed in different MMS for non-dairy cattle for 1995 and 2007–2019, make the appropriate recalculations for the estimates of CH_4 and N_2O emissions from MMS and N2O emissions from agricultural soils, and ensure consistent reporting between CRF tables 3.B and 3.D and the NIR.	Yes. Accuracy
A.18	3.H Urea application – CO_2	The Party reported in CRF table 3.H a CO_2 IEF of 200.00 t CO_2-C/t for urea application for 1990–2021. However, in the NIR (section 5.3.2, p.227), the Party reported that a tier 1 approach and a default EF of 0.20 t CO_2-C/t (2006 IPCC Guidelines, vol. 4, chap. 11.4) were used to calculate the emissions for the category. During the review, the Party clarified that this inconsistency was caused by a technical error, namely, the incorrect application of the unit of the amount of urea used. The amount of urea reported in CRF table 3.G-I for 1990–2021	Yes. Convention reporting adherence

ID#	*Finding classification*	*Description of finding with recommendation or encouragement*	*Is finding an issue/problem?*[a]
		is in kt instead of t. The calculation sheet provided during the review confirmed that this mistake does not affect the level of CO_2 emissions.	
		The ERT recommends that the Party correctly report the AD (in t) for urea application per year in CRF table 3.H for all the years of the time series for the next submission to result in the correct IEF of 0.20 t CO_2-C/t.	
LULUCF		No findings for the LULUCF sector additional to those included in table 3 were made by the ERT during the review.	
Waste			
W.10	5. General (waste)	The Party did not include information in the NIR on the precursors CO, NO_X and NMVOCs, or SO_X, the emissions of which are reported for other sectors.	Not an issue/problem
		During the review, the Party clarified that a methodology for estimating emissions of these gases is not included in the 2006 IPCC Guidelines. Taking into account that paragraph 29 of the UNFCCC Annex I inventory reporting guidelines relates to a non-mandatory requirement, as well as the Party's resource limitations, the Party currently does not have plans to include in its inventory information on these gases.	
		The ERT encourages the Party to include in the inventory estimates for the precursor gases CO, NO_X and NMVOCs, as well as SO_X, in accordance with paragraph 29 of the UNFCCC Annex I inventory reporting guidelines, for the waste sector, consistent with its reporting of these gases for other sectors.	
W.11	5.A.1.a Anaerobic – CH_4	The Party reported in the notes to NIR table 7.6 (p.409) that the value 0.21 was used as a conversion factor for the volume of waste (m3) to the mass of waste (t). However, the Party did not describe in its NIR the reason for using a constant value for the conversion factor and did not provide references to support the value used. The ERT noted that the value does not take into consideration changes over time in waste composition, which is not in accordance with the 2006 IPCC Guidelines (vol. 5, chap. 3.2.2, p.3.12).	Yes. Accuracy
		During the review, the Party clarified that this value is based on various standards for various years (Gosstroy of the USSR, 1989; Ministry of Regional Development of the Russian Federation, 2010; Ministry of Construction of Russia, 2016) for MSW generated in residential buildings. The value is given in various reference documents (e.g. Maslennikov, 2006; Mirny et al., 2010) as the average for MSW in a container and after unloading from a garbage truck. The Party also mentioned that studying the historical density of MSW is difficult because density is related to historical composition of MSW and the density of its individual components.	
		The ERT recommends that the Party better document in the NIR the conversion factor used for waste and its applicability over the entire time series, as well as reconsider the use of a constant value and provide revised values, if necessary, for historical data (1960–1990) in order to improve the accuracy of the AD used for the entire time series.	
W.12	5.A.2 Unmanaged waste disposal sites – CH_4	The ERT noted that in the previous review report (FCCC/ARR/2020/RUS, ID# W.13), the Russian Federation was recommended to revise its data on waste disposed of at non-centralized SWDS, revise existing estimates of emissions from the waste generated and disposed of by the rural population, and use the revised and improved data to revise and report CH_4 emission estimates for category 5.A.2 (unmanaged waste disposal sites), as appropriate, for its next submission. The ERT noted that the Party excluded from the 2023 submission the estimates of waste generated and disposed of by the rural population across the entire time series, only partially following the	Yes. Completeness

ID#	Finding classification	Description of finding with recommendation or encouragement	Is finding an issue/problem?[a]
		previous recommendation. However, the data on waste disposed of at non-centralized SWDS were not revised and used to revise and report CH_4 emission estimates for category 5.A.2 (unmanaged waste disposal sites): in CRF table 5.C, the AD and emissions from unmanaged waste disposal sites are reported as "NO" across the entire time series. In the NIR, the Party provided no justification supporting the use of this notation key and no explanation as to why the unmanaged waste disposal sites previously accounted for are considered as "NO" in the current submission across the time series. The ERT noted that the exclusion of emissions for the subcategory from the inventory decreased the CH_4 estimates for solid waste disposal by about 250 kt annually, which is above 10 per cent of the annual emissions for the subcategory (reaching almost 20 per cent for the beginning of the reporting period). There are no references supporting the revised reporting and assumptions used. During the review, the Party informed the ERT that the MSW collection system has been reorganized and its population coverage is now almost 100 per cent, including in rural areas, which will be taken into account when developing the next NIR. The ERT noted that the notation key "NO" can be used only for activities not taking place in the country, for example for unmanaged sites only for the years when managed landfills cover the entire population. The ERT also considers that even though the population coverage may have reached almost 100 per cent, including in rural areas, in recent years, the use of "NO" is not applicable for the data on unmanaged SWDS for the historical years from 1960. The ERT recommends that the Party improve its data on waste collection in rural areas, revise its data on waste disposed of at non-centralized SWDS, and calculate and report CH_4 emission estimates for category 5.A.2 (unmanaged waste disposal sites), as appropriate, across the entire time series in its next submission. The ERT also recommends that the Party transparently document in the NIR the waste disposal practices in rural areas, as well as the methodology, including information on the data and assumptions, used for estimating the emissions.	
W.13	5.C.1 Waste incineration – CO_2, N_2O and CH_4	The Party reported AD in NIR table 7.10 (p.418) on sewage sludge from Saint Petersburg's incinerators and the population connected to a sewage collection service across the time series. The ERT noted that between 2019 and 2021, the quantity of incinerated sludge decreased (in 2019 it was 995.4 t/day, in 2020 it was 906.7 t/day and in 2021 it was 725.4 t/day), while the population covered is more or less constant (5,383,900 in 2019, 5,398,100 in 2020 and 5,384,300 in 2021). During the review, the Party clarified that the AD for incinerated sewage sludge were obtained directly from incineration plants and that the emission fluctuations correlate with the number of residents and the amount of industrial wastewater that enters Saint Petersburg's wastewater treatment system. The ERT recommends that the Party include a clarification of the factors impacting the AD (quantities of sewage sludge incinerated) between 2019 and 2021 as a note to NIR table 7.10 in the next submission.	Yes. Transparency
W.14	5.D.1 Domestic wastewater – CH_4	The Party reported AD in NIR table 7.12 (p.423) on the population connected to the centralized wastewater treatment systems equipped with digesters. The ERT noted that the Party reported in this table a constant value for the share of the treatment plants equipped with digesters for each type of settlement for the whole time series. For example, the share of the population connected to the centralized wastewater treatment plants equipped with digesters for cities with 50,000–99,999 inhabitants is 8 per cent, for cities with 500,000–999,999 inhabitants is 13 per cent and for cities with more than 1 million inhabitants is 28 per cent, and these values remain the same over 1990–2021. The Party did not describe in its NIR the assumptions that justify the use of constant values across the	Yes. Accuracy

ID#	*Finding classification*	*Description of finding with recommendation or encouragement*	*Is finding an issue/problem?*[a]
		entire time series. In addition, the ERT could not reproduce the totals in the last column of NIR table 7.12 using the input data from the same table. During the review, the Party informed the ERT that there has been no study on the dynamics of the number of residents connected to wastewater treatment plants equipped with digesters but that it plans to conduct a study over the next year. The Party also clarified that a more accurate value of 27.77 per cent was used in the estimation of the AD for cities with more than 1 million inhabitants instead of the value of 28 per cent reported in NIR table 7.12, which explains the slightly different sum reported in the last column of the table. The ERT recommends that the Party update the constant value (percentage) used for wastewater treatment plants equipped with biodigesters in NIR table 7.12 on the basis of the results of the planned study on the number of residents connected to wastewater treatment plants equipped with digesters, taking into consideration changes across the time series and the evolution of the number of centralized wastewater treatment plants equipped with digesters. The ERT also recommends that the Party present in NIR table 7.12 the actual percentage value used in the estimates for cities with more than 1 million inhabitants (i.e. 27.77 per cent), instead of a rounded value.	
W.15	5.D.1 Domestic wastewater – CH_4	The Party reported in NIR table 7.14 (p.425) the use of an MCF value of 0.4 to calculate CH_4 emissions from wastewater treatment pathway 4 (latrines). The ERT noted that, according to the 2006 IPCC Guidelines (vol. 6, chap. 6.2.2.2, table 6.3, p.6.13) for this type of treatment and discharge pathway, a range of MCFs is provided, which vary from 0.05 to 1 depending on climatic conditions and the groundwater layer. The ERT also noted that the Party did not provide a justification for its choice of 0.4 for the MCF. During the review, the Party clarified that 0.4 was used as an average of the range for latrines (0.1–1), since this value applies to all residential premises not equipped with a sewerage system. According to the 2006 IPCC Guidelines (vol. 6, chap. 6.2.2.2, table 6.3, p.6.13), not only climatic conditions, but also the design of latrines, the regularity of sediment removal and the number of users are important for determining the MCF value, and taking into account all these factors is a complex task. Since the Russian Federation does not yet have sufficient data, it decided to use the average value. The ERT agreed with this approach. The ERT recommends that the Party justify the assumptions for the choice of 0.4 as the MCF for wastewater treatment pathway 4 (latrines) in the NIR. The ERT encourages the Party to evaluate the possibility of distinguishing wastewater from treatment pathway 4 (latrines), depending on the climatic conditions and the groundwater layer, as shown in the 2006 IPCC Guidelines (vol. 6, chap. 6.2.2.2, table 6.3, p.6.13).	Yes. Transparency

[a] Recommendations made by the ERT during the review are related to issues as defined in para. 81 of the UNFCCC review guidelines or problems as defined in para. 69 of the Article 8 review guidelines.

VI. Questions of implementation

10. No questions of implementation were identified by the ERT during the individual review of the Party's 2023 inventory submission.

Annex I

Overview of greenhouse gas emissions and removals as reported by the Russian Federation in its 2023 inventory submission

Tables I.1–I.3 provide an overview of the total GHG emissions and removals as reported by the Russian Federation.

Table I.1
Total greenhouse gas emissions and removals for the Russian Federation, base year–2021
(kt CO_2 eq)

	Total GHG emissions excluding indirect CO_2 emissions		*Total GHG emissions and removals including indirect CO_2 emission*[a]	
	Total including LULUCF	*Total excluding LULUCF*	*Total including LULUCF*	*Total excluding LULUCF*
1990	3 089 163.44	3 166 579.05	NA	NA
1995	1 811 559.52	2 070 711.49	NA	NA
2000	1 421 744.11	1 895 001.38	NA	NA
2010	1 321 327.29	2 019 393.43	NA	NA
2015	1 450 053.37	2 033 334.96	NA	NA
2020	1 503 549.95	2 061 109.86	NA	NA
2021	1 650 019.08	2 156 599.34	NA	NA

[a] The Party did not report indirect CO_2 emissions in CRF table 6.

Table I.2
Greenhouse gas emissions and removals by gas for the Russian Federation, excluding land use, land-use change and forestry, 1990–2021
(kt CO_2 eq)

	CO_2[a]	*CH_4*	*N_2O*	*HFCs*	*PFCs*	*Unspecified mix of HFCs and PFCs*	*SF_6*	*NF_3*
1990	2 536 247.74	438 513.50	139 337.06	35 937.16	15 105.81	NO	1 437.79	NO
1995	1 619 727.12	333 981.36	87 416.54	15 447.31	13 453.88	NO	685.29	NO
2000	1 479 142.48	304 963.24	73 500.14	26 569.76	9 867.31	NO	958.45	NO
2010	1 632 783.16	296 460.62	72 078.10	13 444.56	3 630.76	NO	996.23	NO
2015	1 638 675.26	289 930.20	77 737.50	22 456.24	3 505.88	NO	1 028.59	1.30
2020	1 632 929.31	299 884.33	86 475.46	39 081.79	1 685.54	NO	1 051.31	2.11
2021	1 711 993.32	314 778.31	88 400.86	38 619.93	1 628.56	NO	1 176.77	1.59
Percentage change for 1990–2021	**–32.5**	**–28.2**	**–36.6**	**7.5**	**–89.2**	**NA**	**–18.2**	**NA**

[a] The Russian Federation did not report indirect CO_2 emissions in CRF table 6.

Table I.3
Greenhouse gas emissions and removals by sector for the Russian Federation, 1990–2021
(kt CO_2 eq)

	Energy	*IPPU*	*Agriculture*	*LULUCF*	*Waste*	*Other*
1990	2 577 132.87	286 507.76	250 734.98	–77 415.61	52 203.44	NO
1995	1 669 245.12	184 756.91	165 439.98	–259 151.97	51 269.49	NO
2000	1 521 020.60	198 604.93	120 764.27	–473 257.27	54 611.59	NO
2010	1 639 330.25	204 389.90	105 420.26	–698 066.14	70 253.02	NO
2015	1 611 299.30	228 047.79	110 545.43	–583 281.59	83 442.44	NO
2020	1 593 849.58	254 393.52	118 805.28	–557 559.91	94 061.48	NO
2021	1 679 103.65	259 516.02	121 284.74	–506 580.26	96 694.93	NO

	Energy	*IPPU*	*Agriculture*	*LULUCF*	*Waste*	*Other*
Percentage change for 1990–2021	**–34.8**	**–9.4**	**–51.6**	**554.4**	**85.2**	**NA**

Notes: (1) the Russian Federation did not report emissions or removals for the sector other (sector 6); (2) the Russian Federation did not report indirect CO_2 emissions in CRF table 6.

Annex II

Additional information to support findings in table 2

Missing categories that may affect completeness

The categories for which estimation methods are included in the 2006 IPCC Guidelines that were reported as "NE" or for which the ERT otherwise determined that there may be an issue with the completeness of the reporting in the Party's inventory are:

(a) 1.A.3.b road transportation – gaseous fuels (CO_2, CH_4 and N_2O) (see ID# E.22 in table 5);

(b) 2.E electronics industry (HFCs, PFCs, SF_6 and NF_3) (see ID# I.11 in table 3);

(c) 2.G.2 SF_6 and PFCs from other product use (PFCs and SF_6) (see ID# I.19 in table 3);

(d) 4.B.1 cropland remaining cropland – mineral soils (CO_2) (see ID# L.28 in table 3);

(e) 4.C.1 grassland remaining grassland – mineral soils (CO_2) (see ID# L.30 in table 3);

(f) 4.C.2.3 wetlands converted to grassland – organic soils (CO_2) (see ID# L.34 in table 3);

(g) 5.A.2 unmanaged waste disposal sites (CH_4) (see ID# W.12 in table 5).

Annex III

Reference documents

A. Reports of the Intergovernmental Panel on Climate Change

IPCC. 2003. *Good Practice Guidance for Land Use, Land-Use Change and Forestry*. J Penman, M Gytarsky, T Hiraishi, et al. (eds.). Hayama, Japan: Institute for Global Environmental Strategies. Available at https://www.ipcc.ch/publication/good-practice-guidance-for-land-use-land-use-change-and-forestry/.

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B. UNFCCC documents

Annual review reports

Reports on the individual reviews of the 2012, 2013, 2014, 2015, 2016, 2017, 2018 and 2020 annual submissions of the Russian Federation, contained in documents FCCC/ARR/2012/RUS, FCCC/ARR/2013/RUS, FCCC/ARR/2014/RUS, FCCC/ARR/2015/RUS, FCCC/ARR/2016/RUS, FCCC/ARR/2017/RUS, FCCC/ARR/2018/RUS and FCCC/ARR/2020/RUS respectively.

Other

Aggregate information on greenhouse gas emissions by sources and removals by sinks for Parties included in Annex I to the Convention. Note by the secretariat. Available at https://unfccc.int/documents/510888.

Annual status report for the Russian Federation for 2023. Available at https://unfccc.int/sites/default/files/resource/asr2023_RUS.pdf.

C. Other documents used during the review

Responses to questions during the review were received from Alexander Nakhutin (Institute of Global Climate and Ecology), including additional material on the methodology and assumptions used. The following references may not conform to UNFCCC editorial style as some have been reproduced as received:

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Information and technical reference book on the best available technologies ITS 2-2019 “Production of ammonia, mineral fertilizers and inorganic acids (approved by order of the Federal Agency for Technical Regulations and Metrology dated Dec 12, 2019 N2983”. ИТС НДТ 2-2019», pp.169, 178, 188, 196). Available at https://base.garant.ru/73333508/

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Dedikov J.V., Akopova G.S., Gladkaja N.G., Piotrovskij A.S., Markellov V.A., Salichov S.S., Kaesler H., Ramm A., Muller von Blumencron A., Lelieveld J. Estimating Mathane Realeases from Natural Gas Production and Transmission in Russia. Atmospheric Environment, 1999 (33), 3291- 3299.

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Гюнтер Л.И., Гольдфарб Л.Л. (1996). Отчет по теме: «Определение количества и характе-ристик бытовых и промышленных (от различных отраслей хозяйства) сточных вод для оценки эмиссии CH4 в атмосферу и утилизации биогаза, образующегося при обработке сточных вод в России» НПФ «БИФАР» – М.

Загреев В. В., Сухих В. И., Швиденко А. 3., Гусев Н. Н., Мошкалев А. Г. (1992). Общесоюзные нормативы для таксации лесов. – М.: Колос,. – 495 с.

Замолодчиков Д.Г., Грабовский В.И., Честных О.В. (2021). Новая оценка баланса углерода в лесах федеральных округов Российской Федерации // Биоразнообразие и функционирование лесных экосистем. М.: Товарищество научных изданий КМК. С.153-174.

«Лесоустроительной инструкцией», утвержденную приказом Минприроды России от 29 марта 2018 г. № 122.

Малышев Ю. Н., Айруни А. Т. Комплексная дегазация угольных шахт. – М.: Изд-во Акад. горн. наук, – 327с., 1999.

Масленников А.Ю. (2006). Мусоросортировочные предприятия. Справочник. Москва, 2006. -127 с.

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Методические указания по проведению выборочного федерального статистического наблюдения за сельскохозяйственной деятельностью личных подсобных и других индивидуальных хозяйств граждан. Приказ Росстата от 25.09.2019 г. № 552.

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